The Chemical Age

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Contents

NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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Dr. Levenstein's Address

THE annual meeting of the British Association of Chemists on Saturday appears to have been an entirely happy and successful gathering, and the address delivered from the chair at the annual dinner by Dr. Herbert Levenstein would in itself have repaid a visit to Manchester. Dr. Levenstein was there as a distinguished chemist, but, incidentally, also as an employer. The point is interesting in view of the recent registration of the Association under the Trades Union Act. Most of the trade unions confine their membership to employees, and their by-laws or rules specifically exclude, not only employers, but employees occupying managerial positions where they represent mainly the interests of the firm or company. The British Association of Chemists has preferred a broader basis. As it was neatly put on Saturday, the members have registered themselves, not as a trade union, but as a body of professional men under the Trade Union Act. The distinction is not without a difference. It means, in practice, that all chemists, whether employing or employed, are eligible for membership, and the Association hopes to provide common ground and professional fellowship for both classes. The ideal is admirable. It has been attempted by other similar bodies, such as the Institute of Journalists, though in that case with less than complete success. How it will work out in the case of chemists it is too early to say. At present certainly the prospects are good. A very considerable accession to the membership is reported for the past year, and an ambitious programme for future extension is contemplated. If the Association succeeds in keeping the bond between employers and employed and finds the presence of employers a help and not a hindrance to its plans for improving salaries and conditions, every one, we are sure, will welcome such a result.

It is not further estrangement but closer relations and a better understanding between the two classes that British industry needs.

It is good to find the tone of the meeting so deliberately friendly to the Institute of Chemistry, but we are not quite sure if we understand fully the relation of the two bodies for the future which Dr. Levenstein proposed. At present there is no open hostility between them; only a little domestic coolness such as might prevail between relatives, or relatives-at-law. It is evidently the wish of the B.A.C. that the relations should be closer and more cordial. According to Dr. Levenstein, all chemists of suitable qualifications should be members of the Institute, whose Fellowship already has a high value, and membership of the Institute should bring with it membership of the B.A.C. This implies some kind of definite federal relation, which might not be impossible, although rather difficult to bring about. Possibly the position may be affected by the Peterson judgment referred to last week. As a chartered body the Institute would seem to be debarred from taking official action regarding salaries and working conditions, whereas the B.A.C., now registered as a trade union, is fully equipped for this work. The situation is interesting, and, no doubt, more will be heard about it.

On some points affecting the remuneration and conditions of research work Dr. Levenstein spoke with interest and authority. He puts down the cost of one research chemist at £700 a year, and where 10 are employed the outlay looks considerable, especially as beforehand the employer has no guarantee of results. As he says, this expenditure may be unproductive in nine cases out of ten, and the tenth, which proves productive, must compensate for the other losses. Consequently the employer holds himself entitled to the one fertile egg. From the chemist's point of view, however, it must be remembered that he is paid on actual research work, whether it yields commercial results or not, and that, though the expenditure in many cases may bring no return, it is expenditure that no progressive chemical firm could afford to withhold. When, therefore, such research

work is successful, no doubt the firm employing the chemist is entitled to the result, but this does not dispose of the chemist's equitable claim that, having discovered some new point of immense commercial value, he should not have some share in the reward. As to restrictive agreements, the case made out by Dr. Levenstein seems conclusive, for without them firms would have no security; the point is, as he says, that they should be fair to both sides, and while many are, we fear it would be too much to claim this for all. Inquiry would probably show that it is not the fair, but the unfair, agreements that chemists object to.

The Test of Profiteering

In several quarters there is considerable confusion as to what really constitutes profiteering. The prices charged in themselves are not a sufficient test unless all the attendant circumstances are also taken into account. The practice of fixing a standard price at which the manufacturers supply goods would be simple enough, if the manufacturers were always able to supply the demand. It may happen, however, that out of ten applicants the manufacturers might only be able or be disposed to supply more than one or two, and the remainder have to obtain the stuff in the open market. Prices in the market fluctuate considerably, owing to the strength or weakness of the demand, and since dealers take their risk of a drop of prices it is natural that they should claim the benefit of a rise. In this way only can gains and losses be balanced. This reasoning in ordinary market conditions would hardly be questioned. It is the principle on which business is conducted. A firm which buys well gets the benefit of a good market, and where it buys badly it accepts the loss. These are the ordinary chances of trading which everyone is familiar with.

Where, however, there is an official fixation of prices at the source the case is different. The object of fixing manufacturers' prices is to secure a reasonable price to the consumer, and any prices charged in later transactions as the stuff is gradually distributed through the trade should bear a reasonable relation to the original fixed price. It is possible that soda crystals, sold originally at £5. 10s., might later reach a much higher figure as the goods pass from one to another, without any party to the transactions being guilty of profiteering. On the other hand, a merchant who bought at the fixed price of £5. 10s., and in response to an urgent inquiry sold out at double that figure, would be profiting by the exceptional scarcity of the market, and his action would be defeating the purpose in view when the prices were fixed.

It is very difficult in these cases to lay down any fixed rule. Each case must be governed by the circumstances, and the courts use their discretion in deciding. It is all a question of what constitutes a fair trading profit as between what a merchant buys at and what he sells at. In the absence of any control he is, of course, free to make the most of any favourable conditions that may arise. But where, at the source, a price is fixed for the specific purpose of enabling the consumer to obtain goods at a reasonable figure, that fact must be frankly taken into account in whatever transactions may follow. Otherwise, the consumer is deprived of the protection he is entitled to, and the purpose of the manufacturers in agreeing to sell at a fixed figure, often much lower than might be obtained in a competitive market, is defeated. To put it shortly, where prices are unfixed and the market is simply controlled by supply and demand, speculation is quite permissible. The speculator takes his risk of loss and gain, and the buyer understands the circumstances. Where, however, prices are fixed, transactions must be done on that basis, and any speculation beyond this properly runs the risk of the penalties attaching to profiteering.

Chemical Organisation

In his speech at the London Section of the Society of Chemical Industry on Monday evening, Sir William Pope touched briefly upon some matters of great interest in their bearing on the organisation of the chemical interests of this country. The Federal Council for Pure and Applied Chemistry already comprises about twenty societies interested in chemistry in one aspect or another, and the grouping of these bodies under one central council is in itself a great step forward. A central council needs a central home, and the next step, roughly estimated to cost half a million, is to provide one in London. The raising of such a sum in days when taxes absorb so large a margin of income is no easy matter, but it should not be beyond the resources of chemical industry, if these can be freely enlisted.

Sir William Pope seemed to have some hesitation about applying for a Government grant-in-aid, bearing some proportion to the sum raised from voluntary sources. We see no need for hesitation at all. It has been quite usual to extort from the Treasury in support of educational and other schemes promises in advance of aid to the extent, say, of one-quarter or one-half of the amount raised by the promoters themselves. The scheme outlined is one of national importance. Chemical science and industry have recently done so much to save this country that the nation may reasonably be asked to honour some small fraction of its great debt. If a Treasury grant of necessity meant weakening the call on the industry itself for its fullest possible output, we might approve the hesitation. But in connection with some of the provincial universities, particularly the Welsh university colleges, the promise of grants-in-aid has been so conditioned as to serve as a stimulant rather than as a sedative to private exertions. It requires some boldness, no doubt, to approach the Chancellor of the Exchequer in these times, but the rewards only fall to the importunate, and here at least the supplicants would have a great cause to plead.

Touching for a moment on the affairs of the Society itself, the President announced that the only means by which a further increase of subscriptions could be avoided was to secure new members and to enhance the usefulness of the Journal. The meaning of the latter point is clearer, no doubt, to members of the Council than to outsiders, but the other is obvious. There are plenty of members yet to be had, and the simplest and most direct way of getting them is to make known as fully as possible through every avail-

able channel the excellent work the Society is doing. There is no hope in the policy of hiding the Society's light under a bushel.

Chemical Industry Club

IT is an achievement, as Dr. Ormandy pointed out at the Annual Meeting of the Chemical Industry Club last week, to have established that Institution so early in its career as the recognised social centre of chemical industry. The definite relations now established between the Club and the Federal Council for Pure and Applied Chemistry will further strengthen the position, and the Club may henceforth be regarded as a part of the large scheme which will presently be set going for establishing a central chemical headquarters in London. What is wanted is a further increase in membership. It is thought that the present accommodation would be quite equal to a membership of a thousand, and with very little effort on the part of the present members that figure could be reached. The second annual dinner, to be held this month at the Connaught Rooms, should be a good starting point for recruiting. The occasion will be thrown more widely open than last year, and the speaking, with Sir William Pope, Lord Moulton, Mr. Max Muspratt, and others, should be attractive.

The Club certainly has claims on the industry, for it provides both for town and for country members social facilities to be found nowhere else. The coming season, moreover, promises to be especially interesting, in view of the suggestions offered at the annual meeting. One of these related to the holding of periodical club dinners, at which some well-known speaker, not necessarily from within the industry, might be the principal guest. Luncheons and dinners of this class, partly social and partly educational, are now a regular and most popular feature in connection with political and other institutions, and one could imagine no more attractive function than a Club dinner organised to welcome Mr. Coley on his return. The discussions last season were generally good, and in some cases excellent. It is said that chemists when they meet talk too much "shop" in the language of the laboratory. The habit might be usefully corrected by discussing some of the many public as distinct from the purely scientific aspects of chemical problems, and by bringing in speakers from outside, for it is often the imaginative outsider who best interprets chemists to themselves.

Dyestuffs

A GOOD deal of nonsense is appearing in the daily press just now on the subject of imported German dyestuffs. One might imagine that, instead of dyestuffs being short in this country, we were being flooded with German stuff at prices which threatened the very existence of our recently born industry. As we have pointed out before, the reparation dyestuffs received from Germany are not imported for the benefit of the German makers, but for the benefit of the British users, and are intended to keep going the British industries dependent on adequate colour supplies. German dyestuffs, therefore, coming into this country are very much the same as German coal going into France—the advantage lies with the importing and not with the exporting country.

In the questions, some of them rather superficial, put in the House of Commons on Monday, reference was made to the "anti-dumping Bill," which the Government propose to introduce shortly and which will include dyestuffs within its provisions. For the protection of the home industry, still in a comparatively early stage, it is intended only to permit the import of synthetic dyestuffs under licence, so as to safeguard the market against being swamped. This matter is one of first-rate importance to all manufacturers, distributors, and users of dyestuffs in this country, and as many other industries are dependent on the dyestuffs industry it is necessary that the new system should be accurately and equitably designed to meet national needs all round. It would seem, therefore, desirable that the whole question should, without loss of time, be considered by a conference representative of all the interests affected. The suggestion that the Board of Trade might take the initiative in convening such a conference seems to us excellent.

The Strike Over

THE coal strike is over. There was a widespread feeling from the beginning that the points in dispute were too unsubstantial to justify the national stoppage of industry which must soon have resulted. Loss there has already been, as well as anxiety, to all in charge of our industries; but against the loss may be set a certain gain in public education. Our labour leaders, fortunately—even those regarded as extreme—are honest and loyal citizens. We are sure that of the great body of the working class as much may be said with complete truth. And the threat of national disaster has forced them to put their weight against that of the comparatively small, but noisy and active, minority, who are frankly out for mischief. The menace has passed. The trial has shown that labour as a whole is sound and loyal. The exchange of opinions during the negotiations has brought the Government and the responsible labour leaders closer together. The danger through which we have happily passed has united, as it did during the war, the best and most stable elements in our national life.

The Calendar

Nov.		
4	Chemical Society. 8 p.m.	Burlington House, Piccadilly, London
6	Institution of British Foundrymen: "The Application of Pyrometers to Foundry Work," by W. Bowen.	College of Technology, Manchester.
8	Biochemical Society.....	Imperial College of Science, South Kensington, London.
8	Society of Chemical Industry. 4.15 p.m.	Queen's Hotel, Leeds
9	Sheffield Association of Metallurgists and Metallurgical Chemists: "The Value of Evidence in Research," by P. Longmuir.	Sheffield.
9	Institute of Metals: "Fuel," by J. A. C. Edmiston. 8 p.m.	39, Elmbank Crescent, Glasgow.
9	Royal College of Science, Old Students' Association: "The Nationalisation of Universities," by Lord Haldane.	Imperial College of Science and Technology, SouthKensington.

A National Policy for British Chemists

Dr. Levenstein's Address to the B.A.C.

In connection with the annual meeting in Manchester (reported elsewhere) of the British Association of Chemists, a dinner was held which was largely attended. The chair was taken by Dr. Herbert Levinstein (British Dyestuffs Corporation, Ltd.), who reviewed the position of the chemical profession in an important speech.

Dr. Levinstein, in extending a hearty welcome to the delegates, said that he was never so happy as when he was meeting his colleagues of the chemical profession. Most of them spent the greater part of their time in their laboratories and factories, and it was very desirable that they should meet together occasionally and become more closely acquainted with each other. Personally, he must confess to having felt a little trepidation in coming among them that evening, because they had just become trade unionists—(laughter)—and although he was proud to be a trade unionist, it was rather a novel idea to him. Whatever rules and regulations they might have in their union, he thought that some of the employers, and he for one, would insist on coming to their meetings. (Cheers.)

With regard to the objects of the B.A.C., he felt a little trepidation, because, although he was proud to be an original member of their Association, he had not attended any of their meetings, and he was not at all sure that some of those meetings were altogether in accordance with another institution of which he was also a member. (Laughter.) The one thing that he wanted to say was that he was proud to be a chemist. The profession was a most honourable one, and he believed it tended to draw all of their colleagues closer together than any other profession. It was quite true that chemists probably elsewhere, but certainly in this country, did not get the status which other professional people enjoyed. In the popular estimation, a man who spent his life in the pursuit of chemistry had not the same social prestige as a successful stockbroker.

Alliance with the Institute

He took it that the object of the British Association of Chemists was to raise the status of a properly qualified chemist to the same level as that occupied by the members in any other learned or scientific profession. With that object he was in the heartiest and most complete agreement. They had done a very big thing in founding an Association with a membership of 1,200, and clearly in the minds of the people who had taken so active and distinguished a part in establishing it, the idea was to form, if possible, a close association with the Institute of Chemistry. That organisation had certainly carried out a very great service to chemists, and had done rather more than anybody else up to the present to raise the status of chemists, added to which they had a charter, and their qualification was one which was of increasing value. In striving to get together with the Institute of Chemistry he, personally, was quite sure they had been very well advised. He knew that it was in the minds of some of their chief officials, and he concurred in their view that it was extremely advisable to get all chemists of suitable qualifications made members of the Institute of Chemistry, and that membership of the Institute of Chemistry should bring with it membership of the British Association of Chemists. They would then have a chartered institution which could speak for the whole of the profession, and which could see that no one was considered to be a member of that profession who did not fulfil the qualifications demanded by the Institute. He noticed by the bye-laws of the Institute of Chemistry that there were serious difficulties in getting the Institute to move as far as they wanted, and it was, of course, desirable that the Institute should be got to move of their own free will.

Another point he desired to mention was publicity in connection with the British Association of Chemists. He seemed to notice a tendency to over-emphasise the benefits which individual chemists had received and that there was, apparently, under-publicity given to the main object of the Association, which was to raise the professional standing and status of the chemist. It was necessary to preserve a carefully-balanced tone in all the publications which were made, particularly at the present moment. The objects to be achieved by linking together with the Institute of Chemistry were of course clear. They would succeed in having at their backs, as a partner, an institution which, by its charter, could register all chemists, and they would also enable that institution by its sister institution, the British Association of Chemists, to carry out functions or services which were very necessary, and which the Institute, owing to its charter, was not competent to perform. (Cheers).

They would all have in mind the judgment of Mr. Justice Peterson in the case of the Pharmaceutical Society. He considered it of the utmost importance that they should lay down certain professional rules which should govern the conduct of all chemists. This was done in other professions, and *that* was a point he would like to see emphasised and always kept in mind. It was also very advisable that some form of Benevolent Fund should be created so that any necessitous cases could be promptly dealt with. He agreed that there were cases where chemists were inadequately remunerated or where they were treated in a manner which was not consistent with what should be the traditions and the practice of the profession.

Remuneration of Research Chemists

He was rather inclined to criticise, in the friendliest possible manner, the recent publications with regard to two points which had rather attracted his attention. One was the very severe criticism applied to agreements with restrictive or debarring clauses, and the other was the remuneration to chemists for new patent inventions.

Respecting the remuneration of research chemists he could not remember any case where a chemist had not been properly remunerated for a patented invention. He was not at all sure that any case of hardship had ever arisen. He would like them to look at the economics of the matter. These were the salary of a qualified research chemist and also what they might term the standard expenses, such as an office, laboratory apparatus, chemicals and so on. It cost to-day about £700 a year to employ one research chemist, so that if a firm employed 10 research chemists it cost them in five years about £35,000 for experiments. This figure was rather on the underside, but that was all the better for his argument. At a chemical works like the Corporation he was connected with they employed a much larger number of research chemists, and no matter how brilliant such a chemist might be he could not assure a capitalist that he was certain to work out a patented invention inside five years. It was probable that one of the ten would. That money was being paid all that time, and being sunk by the firm, without the certainty of there being any return, so that when an invention was produced which was valuable the possible profits had to cover the expenses of researches which had not materialised in anything valuable. In other words, the fertile eggs had to pay for the bad ones.

It was not to the interests of chemists to endeavour to impose conditions on their employers which were not economically sound, because if those conditions were pressed by a sufficiently powerful Association people would cease to go in for research work He thought that was a point he might fairly put forward.

Restrictive Agreements

This, of course, brought one right up against the question of restrictive agreements. If they were to consider for one moment the case of a chemist working in a research department for a number of years, drawing a salary for a number of years, and causing, in addition to the salary, a considerable amount of expense to the firm which employed him, and who, the moment that he had a good thing, said: "Hello! I have got a good thing; I have been working here a number of years and produced nothing, now I have got something good I am going to leave"; they would all say that a man of that kind was unfit to be a member of their profession. At the same time it was only a matter of ordinary business care for people who were risking their money in this kind of work to make sure that such a thing could not happen.

There was another aspect of the matter which was not directly connected with research. A chemist might be asked to go into a works and take charge of a plant. He immediately became familiar with work which had been designed by others, which had been worked out in the course of time and with the expenditure of a good deal of money by other chemists of past generations and at the expense of the employers. Looking at it in that way he was sure that any chemist would say it was not fair to go and see a process, which, however simple and straightforward now, was the result of a very great deal of experimental work in the past, and immediately go away and turn his knowledge to commercial advantage somewhere else. He would be taking away something which was not his intellectual property; which was the property of his predecessors or fellow-workers. That, again, was a justification for a restrictive clause in an agreement.

Therefore, as one who had seen both sides of the picture, who had been a research chemist and a works chemist, and was at the present moment in charge of factories, he said that a restrictive clause of that kind was necessary to protect the interests of employers and was also necessary to protect the interests of chemists. The point they had to devote their attention to was that these restrictive clauses should be fair restrictive clauses, which was quite a different thing from saying that restrictive clauses were an abomination and must be removed.

Extended Patent Monopoly

With regard to the question of patents, there was a little point that had occurred to him and that was that they might congratulate themselves that the new Patent Act had come into force that year. This was an advantage to their profession, because they got two years more of monopoly for the carrying out of inventions. Of course, they were greatly handicapped in their work by the very unsatisfactory nature of the Patent Laws. It might be said that no patent could be considered sound until the right to it had been fought to the House of Lords. This state of things tended to restrict the inclination of people to pursue research work and made it difficult for them to carry out their inventions. It was difficult to ascertain whether a patent conflicted, or did not conflict, with other patents, and very few people cared nowadays to "feed the lawyers" by fighting patent actions.

Another very important point was the validity of a product claim in a chemical patent. He had consulted some of the most eminent lawyers in the country upon this question, and, in addition, had the great advantage of having Lord Moulton as chairman of a company with which he was connected, but neither Lord Moulton nor any other lawyer could say whether they could uphold a product claim in the House of Lords. He would very much like to see that question settled by Act of Parliament, rather than by the slow, expensive and uncertain way of fighting an action before non-technical judges right up to the House of Lords.

In conclusion, he advised them to endeavour to get the term "chemist" defined in a way which was agreeable to all concerned, and in their publicity efforts to exercise the utmost care not to over-state their case. He wished the British Association of Chemists every prosperity. (Cheers.)

Dr. LEVINSTEIN then proposed the toast of "The British Association of Chemists," which was drunk with enthusiasm.

Friendship with the Institute

Mr. S. REGINALD PRICE, in responding to the toast, said that evening was historic in that it was the first annual gathering at which the British Association of Chemists had met as a legally constituted body. They were now definitely committed to a policy which he hoped, and which all their members hoped, would be consummated. By registering themselves under the Trades Union Act they had accepted a considerable responsibility. Their aim should be to show that a trade union could be a fair, upright and properly constituted body working for the good of a definite cause both from the point of view of employer and employed. He wished to emphasise the point that they were not in dispute at all with the Institute of Chemistry. They fully recognised that the Institute of Chemistry was a body which had done, and was doing, a tremendous work for the profession, but they also recognised, especially in view of the decision in the Pharmaceutical Society's case, that there were certain phases of work which the Institute by its charter could not undertake, and it was one of the objects of the British Association to fill the gap.

A telegram from the President (Professor Hinchley), conveying his heartiest greetings to the members, was then read.

Dr. R. B. FORSTER proposed and Mr. HANNAY responded to the toast of "Kindred Organisations," and Dr. F. W. Kay proposed and Mr. H. E. J. Cory responded to the toast of "The Chemical Industries."

Mr. W. E. KAY having proposed the health of "The Chairman," Dr. Levinstein, in responding, remarked that they were not a trade union, but an association of professional men registered in accordance with the provisions of the Trades Union Act, because, as a matter of legal formality, it was an advantage to be so registered. They claimed not to be an association of tradesmen, but an association of professional men of very high standing. It was very important that this distinction should be kept clearly in mind.

Chemistry of Foods

The Need of Consolidating Food Laws

AT a meeting of the Hull Chemical & Engineering Society on Tuesday, October 19, Mr. Arnold R. Tankard, F.I.C., concluded a course of two lectures on "The Chemistry of Foods."

After dealing with the value of fertilizers in renewing the exhausted fertility of soils, and the need of a better understanding of the nutritive value of foods, he emphasised the importance of purity in food supplies. Milk, flour and other staple articles of food were passed in review and the adulterations practised in these and other cases were considered. The steps taken in the City of Hull to obtain for the people a clean milk-supply were stated, and the reduction in the amount of dirty milk was shown to be from about 20 per cent. in 1912 to 1 per cent. in 1919. The chaotic state of the law regarding milk made it an urgent necessity in the opinion of the lecturer that the Government should provide adequate protection for the public. A plea was entered for the more careful handling of all foodstuffs, both before they come into and after they leave the shops of the retailer, as well as during their stay in the shops. All food should be adequately covered to protect it from contamination, and the sale of milk in sealed bottles was given as an instance of what is desirable in this connection.

The lecturer expressed himself strongly on the question of preservatives in foods. There is at present, he pointed out, no compulsory labelling of preserved food required, except in the case of cream. It was submitted that whatever may be the action of preservatives on the human system, the public, being the consumers, have a right to a choice between preserved and fresh foods, and many persons who knew the facts strongly resented having to swallow considerable quantities of "medicine" with their daily food. It was shown that in all probability numbers of people consume at least a medicinal dose of boric acid daily with their food, and in the opinion of the lecturer much of the indefinite illness of the present generation is quite possibly caused or contributed to by improper "faking" and preservation of our staple foodstuffs. The unnatural and objectionable treatment and additions to wheat-flour were described and condemned, as in none of these cases is there any benefit to the consumer, but rather the reverse. The facing of rice with insoluble silicates, the colouring of foodstuffs, and the use of inferior substances in foods as substitutes for preferable but more expensive constituents were all deprecated, it being pointed out that a large number of cases of arsenical poisoning were directly due to this passion for cheap substitutes. Baking powders containing an acid calcium phosphate were now largely used instead of the cream of tartar powders of a few years ago, and the dangers of the uncontrolled use of phosphate powders was shown in their liability to contain arsenic and calcium sulphate (plaster of Paris) as impurities. The lecture concluded with a plea for a drastic revision and consolidation of our Food Laws.

The meeting concluded with a vote of thanks to the lecturer, proposed by the President (Mr. R. A. Bellwood), and spoken to by Mr. H. Thompson, Mr. Howard Thompson, Mr. A. R. Warnes, Mr. W. Geary and Mr. T. G. Leggott.

The Use of Autoclaves in Chemical Processes

By Thomas Callan, M.Sc., Ph.D.

AN extremely interesting lecture upon this subject was delivered by Dr. Callan (British Dyestuffs Corporation, Ltd.), at the Manchester College of Technology on Thursday, October 28. The subject matter of the lecture was throughout dealt with in a thoroughly practical manner and numerous illustrations were thrown upon the screen.

Dr. Callan said that chemical plant as used in large-scale processes would generally be found to be an adaptation of some laboratory appliance. Thus the filter presses, tubs and vats, &c., of a chemical works were simply the large-scale counterparts of filter funnels and beakers. The autoclave was a large-scale device for carrying out what in organic chemistry were generally termed "sealed tube" reactions. As was well known the velocity of a chemical reaction was enormously increased by raising the temperature; thus the inversion of cane sugar was five times as fast at 55° as at 25°, while at 200°C. the velocity of esterification was 22,000 times as fast as at 8°C.

In the case, therefore, of many reactions which took place with only moderate velocity at comparatively low temperatures it became necessary often to raise considerably the temperature of the reacting materials in order that the reaction might be complete in a reasonable time and to avoid decomposition or side reactions owing to prolonged heating. With this increase of temperature there came a corresponding increase of vapour tension, and, if the temperature was sufficiently high, considerable loss of vapour might take place. If this loss was undesirable, as in many cases it was—for example, if a reaction was required to take place in 10 per cent. caustic soda where loss by evaporation would rapidly increase the content of alkali—then it became necessary to work in an enclosed apparatus capable of withstanding the required pressure. Such apparatus would be the sealed tube of the laboratory or the autoclave of the chemical works. It was important to note that only in very rare instances was the question of pressure, as pressure, important in autoclave work; what was aimed at was the reaching of a temperature with the reacting materials at which the reaction would proceed with the required velocity. The attainment of this required temperature might result in very varying pressures according to the nature of the reacting materials..

In illustration of this a lantern slide was shown illustrating the pressure-temperature curvesf or various concentrations of caustic soda, and Dr. Callan stated that a study of these curves showed how enormously the pressure depended upon the concentration of the reacting mixture. Thus, if a reaction was to take place in 20 per cent. caustic soda solution at 280° the maximum pressure possible was about 65 atmospheres, or 960 lb. per square inch, while with 50 per cent. caustic soda at the same temperature the pressure was only 37 atmospheres, or 555 lb. per square inch, while with 70 per cent. caustic soda it was considerably less.

The pressure-temperature curve for ethyl chloride was next shown. This liquid, at ordinary pressures, boiled at 12·5°C., and to work with it at as low a temperature as 50°C. entailed a working pressure of 60 lb. per square inch. Ethyl chloride was very frequently employed in large-scale organic chemical operations as an ethylating agent and gave rise to very considerable pressures at comparatively low temperatures.

An ordinary steam boiler was a typical autoclave, only differing from the autoclave as previously defined by the fact that in a steam boiler the pressure of the steam was the point aimed at, the temperature of the water corresponding to the pressure being rarely given much attention, while in an autoclave the temperature of the material was the primary factor, the pressure being the secondary factor.

General Points

Dr. Callan then briefly described the chief points, some or all of which an autoclave possessed, the variations in these points constituting the differences between the various types. By the aid of a screen illustration he showed that the characteristic points of an autoclave were (1) a shell in which the reacting materials were placed, though in a special tube form described later this was absent; (2) a lid, which in special types was cast in one piece with the shell; (3) provision for charging the materials into the autoclave, usually in the form of a manhole, though for special purposes a pipe feed might be used; (4) provision for discharging the autoclave; (5) a pressure gauge; (6) a safety valve; (7) means of determining the temperature; (8) provision for agitating the contents of the autoclave with corresponding stuffing-boxes; (9) provision for heating the autoclave. These points, together with the important two points already mentioned, namely, the suitability to withstand the maximum pressure expected and to withstand the corrosive action of the content, comprised all the points on which an autoclave could be judged, and it was the large possible number of combinations of these points which gave rise to the number of varying patterns of autoclaves in daily use in chemical works.

Dealing with the questions of suitability of the material and suitability of the construction of the vessel, Dr. Callan said that upon these two points largely depended the safety of the autoclave when in use. With low pressures or with high pressures on a small laboratory scale these points were satisfied with comparatively little difficulty, but it was otherwise on a large scale. Thus, it was easy to make a large scale vessel to stand low pressures by using quite thin steel castings or to make a small laboratory autoclave to stand high pressures by machining it out of a solid block of steel.

Construction and Capacity

Large-scale autoclaves were usually constructed of cast steel, cast iron, or steel plates, as in boiler construction. Cast-iron autoclaves could be made of 200 gallons capacity, to withstand 300 lb. per square inch working pressure, while if cast steel was used the same size withstood 1,000 lb. per square inch. A 200 gallon cast-iron autoclave could not be built for a greater pressure than 500 lb. per square inch. The most satisfactory type of autoclave, as far as strength was concerned, was undoubtedly that made of forged steel, but this could not be made of any large size on account of the enormous cost. Cast autoclaves were always liable to contain blowholes, and this was a potential source of danger. The provision of suitable strength of material was largely a question for the engineer. In actual practice the custom was to give as large a factor of safety as possible, and then to test the actual autoclave after assembly by applying hydraulic pressure to give a sufficient factor of safety, usually three times the working pressure being sufficient. This testing of autoclaves, however, could be carried too far in the hands of unintelligent persons.

Steel Plates

Steel plates were often used in autoclaves for pressures up to 300 lb. A slide illustration showing analysis of typical steels used was thrown upon the screen. Certain autoclaves made of similar steels to those indicated were found in actual practice to fail very rapidly, showing extensive corrosion under conditions which should not lead to such a result. There was also displayed a microphotograph of such steel, indicating its peculiar laminated nature. According to Prof. Rhead, of the Manchester College of Technology, this laminated structure, to the presence of which failure of the autoclave to stand up to its work was to be attributed, was caused by too heavy pressure and altogether too severe treatment in the rolling of the plates.

Corrosion of Metals

The corrosion of metals by materials under pressure might be very considerably different from the action of the same materials on the same metal when the latter was not under a strain or stresses. In this respect the work of Stromeyer, published in a report to the Manchester Steam Users' Association for 1916-1917, was of extreme interest and value. Stromeyer showed that if steel rings were placed under tension (by forcing one ring tightly inside another) and subjected to the action of caustic soda for several months the rings became hard and brittle, and very readily cracked, while control rings under exactly the same conditions, except that they were not under tension, were unaffected. Stromeyer further showed that stressed bars, composed of open-hearth steel, both acid and basic, Bessemer steel and wrought iron, completely lost

their spring and became extremely hard when exposed to caustic soda. Stromeyer rightly pointed out that this might prove of great practical interest in the case of steel autoclaves of plate construction, such as were largely used in caustic fusions in the dye industry, because of the slacking back of rivets. The use of a small percentage of nickel, usually 3 to 5 per cent., in steel was found in many cases to increase considerably the resistance of steel to caustic soda.

Aluminium and Gun Metal

The suitability of other metals, such as aluminium or gun metal, for autoclave construction was generally judged on the known chemical behaviour of the material to be placed in the autoclave towards the metal, no account being taken of any possible influence of the strains to which the metal was subjected on the possible corrosion. It was interesting to note that gun metal autoclaves were quite porous to many gases at high pressures.

Autoclave Shells

Forged steel shells undoubtedly stood pressures best, but on a large scale the expense was prohibitive. Cast steel was a very satisfactory material to use, and, to a lesser degree, cast iron. Such castings suffered of course from the liability to blow-holes which could not be discovered, and the absence of which had to be assumed provided the autoclave would stand the hydraulic test. If the material of the autoclave permitted, instead of the hydraulic test in the cold, a more searching test, particularly with an autoclave fitted with stuffing-boxes and stirring gear, was to heat up the autoclave with 10 per cent. ammonia to the required test pressure. This should, however, not be done until the hydraulic test had first been applied, as should an autoclave burst under the hydraulic test the loss of a very small amount of water relieved the pressure, while in the case of ammonia the autoclave would probably shatter and cause serious consequential damage. Shells composed of boiler plates riveted together were very undesirable for many purposes, *e.g.*, for caustic fusions in which case the rivets became brittle and were apt to slack back. Moreover it had been found in practice that corrosion of the rivets very often took place at the surface of the molten material inside the autoclave.

Types of Lids

Many autoclaves were made without any lid, the cover and the shell being cast in one part, access to the interior being obtainable only through the charging manhole, but generally speaking the lids were cast separately to the shell and bolted down to it. Dr. Callan then quoted, at some length, Stromeyer's investigations into the question of tightness of autoclave lids as stated in the Memorandum to the Manchester Steam Users' Association, pervicously referred to, and in which the subject is dealt with in great detail.

Means of Charging Autoclaves

Charging an autoclave on a large scale was usually done through a special manhole, or if the reacting materials were fluids, a pipe feed through a special flanged hole could be employed. In the case of caustic fusions and amidations, *i.e.*, the conversion of the sulphonic group of an organic compound into a phenolic group, and the conversion of the phenolic group into an amino group as in the manufacture of beta-naphthylamine from betanaphthol, which two processes comprised a very large proportion of the autoclave reactions carried on in colour works, the material was simply charged in by hand through a manhole, the caustic liquid or ammonia being pumped in through a pipe. The design of the manhole lid was a subject which seemed to have caused considerable trouble to autoclave designers, who in many cases had failed to realise the importance of the subject. A badly designed manhole lid was the cause of very great loss of time. The conditions a lid should fulfil were (1) it should be in a position easily accessible, *e.g.*, well away from the stirring gear, the gauge pipe and the thermometer pipe; (2) it should be capable of being handled readily, hot or cold; (3) it should be capable of being made secure with the greatest ease. Manhole lids could be divided into two types, those which sealed the manhole by having their rims pressing against the inside of the autoclave—inside lids—and those which fitted against the outside of the autoclave—outside lids. Each had their advantages, but from the point of view of the user the outside lid was greatly to be preferred.

Discharging was according to the nature of the contents: (1) Running out by gravity, or digging out when the pressure had fallen to atmospheric pressure; (2) blowing out the material by pressure supplied from outside, *i.e.*, air or steam pressure after the internal pressure had fallen to the pressure of the air or steam to be used; (3) blowing out the material by internal pressure.

The first method was, of course, comparatively simple, but in the two latter methods the arrangement of the blow-over pipe had to be carefully thought out, particularly if the autoclave was mechanically egitated. The third method was greatly to be preferred as considerable saving of time could often be effected. In all cases where an autoclave had to be blown over under its own pressure it was important to have specially tight valves on the blow over pipe, as a very small amount of solidified material could prevent a valve from discharging.

Heating Autoclaves

Dr. Callan then dealt with the various methods of heating autoclaves: direct heat, either fire or gas, oil bath, steam or water bath, superheated steam, metal baths or circulating oil or water through an outer jacket. It was difficult to control the temperatures in direct-fired autoclaves, though they could be rapidly heated and cooled. Oil baths had many advantages for temperatures up to 200°C. The nature of the oil used was of great importance, and sufficient attention was not usually given to the point. A suitable oil should have a flash-point well above the temperature it was to be used at, and should be capable of being heated for many hours without carbonising. As the working temperature became higher it was increasingly difficult to obtain an oil satisfying these requirements. If an autoclave was required to work at, say, 250°C., the oil bath would require to be from 270°C.-300°C., according to the efficiency of the heat insulation. He had, personally, found the "Hekla" brand of cylinder oil of the Vacuum Oil Co. most suitable for the purpose. When the working temperature was too high for oil to be used fusible metal baths could be used to advantage.

Safety Valves

This was a matter upon which Dr. Callan held very decided views. He considered that in the majority of cases the provision of safety valves added nothing whatever to the safety of the plant, and might give a false sense of security. Their design was in practically all cases similar to those for steam boilers, though the problem was entirely different. An autoclave safety valve should be able to relieve a large excess pressure, due possibly to unexpected side reactions or other causes, within a very short time, and without choking by ejected finely-divided particles of solid material. Such excess pressure was liable to develop very rapidly, and it was of little use having a safety valve which would require many hours to relieve this pressure.

The J. W. Aylsworth Continuous Tube Autoclave

This was an entirely novel type of autoclave, and one which in his (Dr. Callan's) opinion had a very promising future before it, although at present the type had not been greatly developed or employed. The autoclave itself consisted of a length or coil of tubing, which could be heated by immersion in a suitable heating bath. Such a coil could readily be made to stand extremely high pressures—*i.e.*, thousands of pounds per square inch—thus permitting the use of comparatively high temperatures, so that many reactions could be carried out at such a temperature that the time of reaction was very small. It thus became possible to complete a reaction by simply pumping the reacting material through the heated coil, the reaction taking place to completion during the comparatively short time required for the materials to traverse the coil. The patent was taken out in America, and the autoclave was primarily designed for the manufacture of phenol by a continuous process, the reacting materials, chlor-benzene and caustic soda, being supplied to the heated coil by separate pumps, the products of the reaction, sodium-chloride and sodium phenate solutions, being subsequently acidified, the phenol separated, and the salt solution run away. Modifications of this type of autoclave had been proposed where the products of reaction could be made to circulate through the pressure coil in those cases where one passage through the coil was insufficient to complete the reaction.

In conclusion, Dr. Callan dealt with the chief reactions carried out in a dye-making works by means of autoclaves, and showed a large number of lantern slides illustrating various types of autoclaves.

Present-Day Methods for the Manufacture of Hydrogen

The Claims of the "Iron-Steam" Process

The writer briefly indicates the methods by which hydrogen is manufactured to-day, and suggests that, except in the case where hydrogen is produced in extremely large quantities, as in synthetic ammonia manufacture, the "iron-steam" process—the oxidation of iron by means of steam, and the subsequent reduction of the magnetic oxide produced by means of water-gas—can be made as satisfactory and economical as the more favoured water-gas catalytic process, as developed by the Badische Anilin und Soda Fabrik.

THE writer has had occasion critically to examine most, if not all, of the processes which have been suggested from time to time for the manufacture of hydrogen, and is of opinion that four only are possible commercial propositions. The many others fail on account of some fundamental difficulty which, if not apparent in advance, shows up very forcibly in practice. A few processes are useful in their specific applications, as for example, the "Silicol" process, which offers a supply of hydrogen for aeronautical purposes in connection with military operations in the field.

The four processes referred to are designated as follows in this article :—

1. The iron-steam process.
2. The water gas catalytic process.
3. The electrolytic process, and
4. The liquefaction of water gas process.

The last two may be dismissed very shortly, and are accordingly treated first.

The Liquefaction of Water Gas Process

Strictly speaking, this process has been misnamed, for the water gas is not liquefied as a whole ; water gas, freed from its ordinary impurities, chiefly sulphur compounds, being subjected to pressure and cooling in, for example, a Linde apparatus, so that under regulated conditions the constituents, with the exception of hydrogen, are liquefied. The hydrogen then escapes through suitable heat exchangers. Unfortunately rather high purification costs are entailed, as the hydrogen contains appreciable quantities of carbon monoxide, the vapour pressure of which is still considerable at the temperature reached in the liquefaction apparatus. The separated carbon monoxide may be used as fuel for the development of power.

The process is not so widely applied as the others mentioned, and it is probable that the high charges for power consumption and the expense of purifying the gas militate against its adoption.

The Electrolytic Process

By the electrolysis of aqueous alkaline or acid solutions, hydrogen and oxygen are, of course, produced, and many types of cell batteries have been suggested. Without attempting to discriminate, it may be said in general that the latest designs are thoroughly efficient, safe and easily manipulated. They are practically automatic in action, and the chance of explosive mixtures of the two gases being obtained through faulty apparatus is very small indeed.

This process is not realisable technically, unless extremely cheap power is available, or (when power is to be developed from coal or gas) unless the oxygen can be sold at a remunerative figure. In this case, the high power charges are off-set, and the cost of the hydrogen consumed is brought down to a price allowing competition with other processes. It must be remembered, however, that mass production of oxygen by the liquefaction and fractionation of air presents a much cheaper source of oxygen.

The Water Gas Catalytic Process

This process is usually accepted as the most successful technical method for the production of hydrogen. It was originally developed by the Badische Anilin und Soda Fabrik, in connection with the manufacture of synthetic ammonia, and has been taken up in this or that form by other countries for a similar purpose. Briefly, the method consists in passing water gas mixed with excess of steam over a suitable catalyst at a raised temperature. Activated iron oxides are used as catalysts, the "promoters" being usually nickel, cobalt, alkaline or alkaline earth oxides, &c. The following reaction takes place, a definite equilibrium point being reached at each particular temperature, and varying, of course, with the amount of steam in excess of the theoretical :—

$$CO+H_2O \rightleftarrows CO_2+H_2.$$

The amounts of carbon monoxide at equilibrium in the presence of three volumes of steam per volume of gas, are 1·25 and 4·05 at 500 deg. and 700 deg. respectively. With five volumes of steam, the figures at the above two temperatures are 0·71 and 2·24.

The reaction is theoretically self supporting as regards heating, being slightly exothermic.

The purification of the gas mixture after reaction is comparatively a simple matter, and reasonably cheap, but, in the writer's opinion, only if a very large capacity plant is operated, and if the gas is to be used subsequently at high pressures. The carbon dioxide is removed by solution in water at a high pressure, and the carbon monoxide by combination with an ammoniacal cuprous chloride solution also under high pressure. An attempt at the American Government ammonia plant to remove an appreciable proportion of the CO by means of hot potash solution under pressure, so as to throw less work on the cuprous chloride towers, was a complete failure.

It is almost certain that unless extremely large quantities of hydrogen are being produced, the pure hydrogen which can be obtained directly by the iron steam method is the product to aim for. The costs of purification on a small production of hydrogen would be comparatively great, and it is doubtful whether so pure a gas could be economically obtained.

Moreover, although the process is exothermic, and can be run without additional heat supply if large quantities of gas are in treatment, and if very efficient heat exchangers are employed, large external heat supplies would undoubtedly be required unless very large units were in operation. Again, a favourite method of adding heat when necessary, namely, by the combustion within the apparatus of a portion of the water gas, would be inapplicable, unless the resultant gas were going to a nitrogen fixation process.

As an example of what is meant by large scale production, it may be stated that the synthetic ammonia plant of the U.S. Government, with its rated capacity of 30 tons of anhydrous ammonia per day, would have to produce about 2,000,000 cubic ft. of hydrogen per day.

As a contrast, a fat hydrogenation plant hardening about 50 tons of liquid oils per day requires only about 100,000 cubic ft. of hydrogen per day. Present day aeronautical stations, where hydrogen is produced for lighter-than-air craft, require plant more in the order of that in fat hydrogenation plants than that in synthetic ammonia plants.

It is the writer's contention that hydrogen plants other than those in ammonia works would not be self-supporting in regard to heat, and that for the pre-heating of the large quantities of steam, and for the maintaining of the reaction temperature by combustion outside the catalytic chamber, such a quantity of, say, water gas would be necessary that the ratio between the volumes of water gas used and the hydrogen produced would be at least 1·5 to 1·0. The theoretical value with a water gas of average composition is just over one to one.

Add to this the cost of power needed in compressing the gas during purification and the cost of the large excess of steam necessary if a low percentage of CO is to be obtained in the gas mixture after catalysis, and a figure is reached which is as high as that at which hydrogen can be produced absolutely pure by the iron-steam process now to be described.

The Iron-Steam Process

Many types of apparatus for the carrying out of this cyclic process have been suggested, but the actual details will not be discussed here. The process depends upon the oxidation, by means of steam, of the iron produced by the action of a reducing gas, such as water gas, upon some form of iron oxide—for instance, spathic iron ore, burnt iron pyrites, briquetted

iron oxide and the like. After the first reduction and oxidation we are concerned, of course, with the ferroso-ferric oxide, Fe_3O_4, which results from the oxidation of iron by steam. The iron charge may be contained in retorts heated externally by the combustion of waste reducing gas, or by means of fresh gas of any kind; or the iron charge may be internally heated by the combustion of gas within the apparatus, as in the Messerschmidt apparatus.

With full utilisation of the so-called waste reducing gases, it has not yet been possible to produce more than one volume of hydrogen from two volumes of water gas, but it is clear that, theoretically, the same heat balance exists here as in the water gas catalytic process, as a consideration of the following equations shows:—

(1) $Fe_3O_4+4CO=4CO_2+3Fe$.
(2) $Fe_3O_4+4H_2=4H_2O+3Fe$.
(3) $6Fe+8H_2O=2Fe_3O_4+8H_2$.
i.e. (4) $4CO+4H_2+8H_2O=4CO_2+4H_2O+8H_2$.

The net result of the cycle is the production of one volume of hydrogen from one volume of carbon monoxide, as in the catalytic process. Admittedly, a much larger quantity of iron requires to be kept at the reaction temperature, 600 deg. to 800 deg. or above, than in the latter process, but it is suggested that with full investigation a more efficient utilisation of the iron charge could be effected, and a greater proportion of the total charge brought into the alternate reactions. Researches into the production of a more suitable iron mass, possibly activated by promoters, would lead to the discovery of a more reactive oxide, with a higher reactive surface, so that a bigger output per unit of space occupied by the charge, with consequent less radiation losses from the hole setting, would ensue. A better utilisation of the waste gases is possible, because for every volume of reducing gas actually used in the process proper, a volume of hydrogen is later obtained. With less radiation losses, and less "waste" heat lost in the flues and settings, with the pre-heating of the steam and reducing gases by means of this waste heat and in fine, by the careful examination of the heat balance of the whole reaction, a much better ratio of production could be obtained. There can scarcely be any doubt that as much hydrogen per unit volume of water gas used could be obtained in this alternate process as could be obtained in the catalytic process, if the hydrogen is to be used for purposes other than mixing with nitrogen (when the burning of a portion of the water gas with air within the catalytic chamber is no disadvantage).

The great advantage of this process remains to be considered. It is possible to produce practically chemically pure hydrogen in this manner. Impurities can only enter by reason of imperfect clearing of the apparatus after reduction of the iron oxide with water gas, prior to the steaming, or from the action of steam on any carbon deposited on the iron during reduction by interaction of the carbon monoxide with the already reduced iron. With a proper study of the complex equilibrium of CO, CO_2, H_2O, carbon and iron and its oxides, it is possible to find such conditions as will prevent the deposition of carbon in all but infinitesimal proportions on the iron. Subsequent steaming leads to the production of hydrogen free from the oxides of carbon, with the exception of a little easily removable dioxide. Periodical aeration of the charge will remove any traces of carbon from the charge and allow the continuous operation of the cyclic process, with the production of pure gas. The purification charges are therefore practically nil, the steam usage is considerably less than in the catalytic process, and the ratio of hydrogen produced to water gas consumed can be brought nearly, if not quite, as low as that obtaining in the Badische process, which has been so carefully developed and boomed with characteristic German thoroughness.

The writer, with no axe to grind, submits, therefore, that the iron-steam process is worthy of greatly increased attention and respect, especially where an undiluted pure hydrogen is required, as in the hydrogenation industry, and for filling airship balloons. The process is as cheap as, more certain, and less troublesome, than any other. The capital cost and depreciation taken over the whole system, purification plant included, is smaller than that of the catalytic German process, especially where comparatively small units are required, as in all technical practice, with the exception of ammonia synthesis.

Foreign Dye-stuff Importations

Questions in Parliament

In the House of Commons, on Monday, Mr. Evelyn Cecil asked the President of the Board of Trade whether his attention had been called to the rapid increase in the imports of dye-stuffs into this country during the last few months; whether they come in great part from Germany; and whether, having regard to the experience of the War and the importance of establishing a largely independent British industry of dyes and allied substances on grounds both of trade and national defence, His Majesty's Government will take further steps to safeguard its growth?

Sir R. Horne: I am aware that the imports of dye-stuffs and intermediates into this country have increased very substantially during the last few months, and that a large proportion of these imports have been from Germany, though I must point out that these include a considerable quantity received from that country under the Reparation Clauses of the Treaty of Versailles. As regards the remainder of the question, I would refer my right hon. Friend to the answer which I gave to my hon. Friend the Member for Royton on July 20 last, to the effect that in the opinion of the Government the existence of a strong synthetic dye making industry is essential to the defence and security of the United Kingdom, and that in pursuance of the pledges given on several occasions, proposals to protect the industry for a time, so as to enable it to be placed on a secure foundation, will be embodied in a Bill relating to key industries, which will be introduced and proceeded with as soon as possible.

Sir W. Pearce: Is my right hon. friend satisfied with the progress of British Dyes, in which undertaking the British Government have a large interest?

Sir R. Horne: I think it is too large a question to ask in a general form whether I am satisfied with the progress. One ought never to be satisfied with any stage of progress.

Mr. G. Terrell: When will a Bill for the preservation of key industries be introduced?

Sir R. Horne: As soon as possible.

Mr. Doyle asked the President of the Board of Trade whether he was aware of the position of the British Dyes Corporation owing to the increasing and unrestricted importation of German dyes; what amount of Government and public funds respectively are invested in the undertaking; whether a guarantee was given that this key industry would be protected; and whether an agreed Bill will be introduced forthwith to safeguard this national asset?

Sir R. Horne: I am informed that the subscribed capital of the British Dye-stuffs Corporation is £4,119,003 in preshares of £1 each, and £993,279 in deferred ordinary shares of ference shares of £1 each, £4,089,811 in preferred ordinary £1 each. Of this, £850,001 preference shares and £850,000 preferred ordinary shares have been subscribed for by H.M. Government.

Mr. Doyle: Is the right hon. gentleman aware that on May 15, 1918, the President of the Board of Trade stated that the importation of all foreign dye-stuffs should be controlled by a system of licence for a period of not less than ten years after the war?

Lieut.-Colonel Croft: Are these licenses, as promised, in force at the present time?

Sir R. Horne: Not yet.

Mr. Doyle: In view of the serious condition of this national asset, the British dyes industry, is the right hon. gentleman prepared to introduce a Bill dealing especially with it?

Sir R. Horne: I think it would be a great mistake to deal with only one industry. There are many others, also key industries, to be dealt with. I should prefer, and I am sure the House will find it more convenient, to deal with them altogether.

Fireworks Offence

At Leeds Police Court, on Monday, Messrs. Watson, Cairn & Co., Ltd., of King Edward Street, Leeds, were summoned for storing 435 lbs. of fireworks, in excess of the amount allowed, and also for storing 175½ lbs. of carbide of calcium without a licence. A fine of £5 on the first summons was imposed, and the other was dismissed under the Probation Act.

Reviews

A TREATISE ON CHEMISTRY. Vol. I. The Non-Metallic Elements. By Sir H. E. Roscoe, F.R.S., and C. Schorlemmer, F.R.S., Fifth edition, revised by Dr. J. C. Cain. London: Macmillan & Co., Ltd. 30s. net.

Since the date of first publication in 1877, Roscoe and Schorlemmer's treatise on inorganic chemistry in two volumes has maintained its position as a standard textbook and reference work on this branch of the subject. Dr. J. C. Cain, who was associated with the late Sir Henry Roscoe in the preparation of the fourth edition, has revised Volume I., incorporating new work which has been published during the nine years which have elapsed since the last edition was published, and has succeeded in producing a work on the non-metallic elements which has no equal in one volume in the English chemical literature.

The general character and style of the previous edition have been maintained, and the volume shows evidence of very careful proof reading, only one misprint being noted—under "Compounds of Carbon and Oxygen," on pages 795 and 796, the formula for Mellitic Anhydride is given as $C_{12}H_9$, instead of $C_{12}O_9$.

One of the commendable features of "Roscoe and Schorlemmer" has always been the accurate description of the more important processes in technical chemistry, and the careful representation of the most approved forms of apparatus used. It is somewhat surprising therefore to find in the present edition, under "Sulphuric Acid," the statement that the acid must be concentrated in platinum or glass vessels. This antiquated method is described as if it represented present-day practice, and no mention is made of the Gaillard, Kessler, or ferro-silicon and fused silica cascade systems. The description of the "contact" suphuric-acid processes might perhaps be improved. Similarly, processes for the synthetic production of ammonia from its elements, and for the production of nitric acid from ammonia and from air, are inadequately treated. In view of the technical importance of these processes and the value to the student of a clear exposition of the underlying principles, these sections should be thoroughly revised at the first opportunity.

A less important point noted is that the student may receive a wrong impression of the construction and working of Lunge towers on a nitric-acid plant by the reference on page 548. Under "Phosphoric Acid" a reference to the papers by the late Dr. J. H. Smith on the "Constitution of the Alkali Phosphates," J.S.C.I, 1917/36/415 and 424, might be included with advantage. Recent gas-industry legislation has overtaken the probability expressed on page 894 in the matter of sale of towns gas on a heat-unit basis.

We offer this criticism concerning descriptions of technical processes because the volume is so often included on account of its worthiness in small-works libraries, and it indicates a possible weakness in an otherwise very valuable work. The reviewer may be allowed to express the hope that the leaves will be cut before issue, thus preventing damage by careless users in the case of library copies. F. M. P.

THE FIREMAN'S HANDBOOK AND GUIDE TO FUEL ECONOMY. By Chas. F. Wade, A.M.I.M.E., A.M.I.E.E. Longmans, Green & Co. 2s. 6d. net.

This is a comprehensive, illustrated handbook dealing concisely and in plain language with industrial fuel, steam boilers, furnaces and steam-boiler fittings. Designed expressly for the use of stokers and furnacemen, it explains as clearly and as simply as possible the correct way in which to fire and otherwise handle steam boilers, mechanical stokers and other furnace plant. Each explanation is, moreover, supported with a lucid exposition of the "reason why." Like most technical handbooks, it is, however, largely a counsel of perfection; but its use and the application of its precepts, so far as possible, by engineers in charge of steam plant, as well as those for which it is primarily designed, should tend materially towards the mitigation of the smoke nuisance and towards progress in effecting and maintaining both furnace and boiler efficiency. A feature of this handbook is a complete absence of illustrations of patented boiler and furnace appliances; but in view of the proved efficacy and extensive application of some of these, this may possibly be regarded by some steam users as an unfortunate omission. It is, of course, easy to understand an author's difficulty in such matters. F. W. L. N.

MARGARINE. By William Clayton, M.Sc. Liverpool. Longmans, Green & Co. 14s. Pp. 179.

This is another monograph on industrial chemistry edited by Sir Edward Thorpe, and is very well done. It claims to be the first of its kind in any language, although in the excellent bibliography at the end of the volume mention is made of Girard and Bevan's "La Margarine et Le Beurre Artificiel," which was published as long ago as 1889. Anyhow, the manufacture of margarine has made rapid strides since the latter book was published, and the author is to be congratulated on producing such an excellent modern book on the subject. It is well illustrated with blocks and photographs of plant, and the chapters on emulsification and nutrional chemistry are particularly welcome in a book of this character. The chapters on the oils and fats used for margarine gives due prominence to the edible hydrogenated oils, although further detail on the technical plant involved would have been of interest. The author supports the view that these hardened vegetable and marine animal oils are excellent foods and possess no hygienic drawback whatever. He omits, however, a discussion on methods of oil refining and deodorisation which should find a place in a new edition.

SAMUEL RIDEAL.

The Conference on Colloids

To the Editor of THE CHEMICAL AGE.

SIR,—In the notes in your leading article of October 30th, on the London Conference on "Colloids," you were kind enough to comment upon the photographs of the fibrous structure of soap "gels." The whole point about these is that they are not gels, but curds.

Soap gels and sols alike show no structure whatsoever in the ultramicroscope; they are both transparent, and they represent identical equilibria, identical in all properties save mechanical rigidity and elasticity, from which it appears to be a legitimate deduction that the colloidal particles in both are identical. Whereas in the sol the colloidal particles are independent of each other, in the gel they are mutually oriented or linked up.

In clear contrast to this, soap curds, which are white opaque solids, are shown by conductivity, by vapour pressure, and by direct and indirect analysis to consist of solutions from which the greater part of the soap has separated out in the form of those long white microscopic and ultramicroscopic fibres which were shown in the photographs. This calls for a clear distinction between gelatinisation on the one hand and crystallisation or coagulation on the other.

I did not speak on the structure of soap curds, but happening to have these photographs with me, it occurred to me that it might be of interest to pass them round, as I may be unable to get most of them published. These fibres have a real existence since Zsigmondy himself in 1912 obtained similar photographs of some of them, and bundles of them can often be seen by the naked eye. It was to Zsigmondy and Bachmanni's work on these curds (not gels) that Dr. Barratt's remarks had referred.—Yours, etc.,

JAMES W. MCBAIN.
(Leverhulme Professor of Physical Chemistry.)

University of Bristol,
October 30, 1920.

Books Received

THE EXPERIMENTAL BASIS OF CHEMISTRY. By Ida Freund. Edited by A. Huchinson and M. Beatrice Thomas. Cambridge University Press. Pp. 408. 30s. net.

THE VOLATILE OILS. By E. Gildemeister and Fr. Hoffmann. Second edition by E. Gildemeister. Second volume. London: Longmans, Green & Co. Pp. 686. 32s. net.

COAL IN GREAT BRITAIN. By Walcot Gibson. London: Edward Arnold. Pp. 311. 21s. net.

Chemical Industry Club

An Interesting Annual Meeting

THE annual meeting of the members of the Chemical Industry Club was held at the Club premises, 2, Whitehall Court, S.W., on Friday evening, October 29. In the absence of Dr. Hodgkinson, Dr. W. R. Ormandy was elected to the chair.

The annual report (published in THE CHEMICAL AGE of October 23) having been read, the Chairman congratulated the members on the excellent position the report revealed. It was, he said, exceedingly gratifying that the Federal Council of Pure and Applied Chemistry had, by allowing three of their members to be co-opted on the Club Committee, practically acknowledged that the Club had now grown to such an extent that it must be recognised as the social centre of chemical industry. If the scheme for the establishment of a central chemical headquarters in London was carried through, they might fairly take it that the Club would form the nucleus of the social side of that venture. The negotiations necessary to secure this important result had called for considerable tact, and the Club was very much indebted in this respect to Mr. Coley, who was still away and whose return they were looking forward to. The Committee had been fortunate in securing in Mr. Bernard F. Davis a most efficient substitute, and the Committee's experiment of appointing Mr. Harvey as assistant secretary had been fully justified. The members were looking forward with interest to the second annual dinner, to be held on November 19 at the Connaught Rooms, and with Lord Moulton, Sir William Pope, Mr. Max Muspratt and others among the speakers they might confidently look forward to a successful evening.

On the motion of Colonel Cullen, seconded by Mr. Ronck, the annual report was unanimously adopted.

Captain C. J. Goodwin, in submitting the treasurer's report, which showed a balance in hand, paid a tribute to the great assistance rendered by the finance and house committees and by the assistant secretary. They had done, he said, very valuable work in controlling the expenditure of the Club, and this was largely responsible for the very satisfactory position in which the Club now stood. The report was unanimously adopted on the motion of Colonel Cullen, seconded by Mr. A. J. Chapman.

Election of Officers.

In proposing the re-election of Mr. H. E. Coley as honorary secretary, Mr. Bernard F. Davis said that all of them recognised what they owed to Mr. Coley in the establishment and development of the Club. Since he had attempted partly to take his place, he had realised more than ever the weight that must have fallen on his shoulders, and they owed to him more than they could express. Mr. Coley, who was still abroad, was extremely disappointed when he found that he would be unable to return in time for the annual meeting and the second annual dinner. He hoped to be back early in December, and it would be gratifying to him to know how well the Club was getting on. Mr. H. M. Ridge, in seconding the motion, which was warmly carried, referred in appreciative terms to the excellent work done by Mr. Bernard F. Davis.

On the motion of Mr. Brewis, seconded by Mr. Dehn, Captain C. J. Goodwin was unanimously re-elected treasurer.

The auditors, Messrs. Hughes and Allen, were also unanimously re-elected.

As the result of the ballot for the election of ten members of the Committee, the following were declared elected :—

Committee.

E. J. Aldric
E. T. Brewis, F.I.C.
Ashley Carter.
E. J. Chapman, F.I.C.
A. G. Craig.
Lt.-Col. W. Cullen.
B. F. Davis, F.I.C.
F. B. Dehn, Ph.D., M.Sc.
W. Graham.
F. E. Hamer.
W. R. E. Hodgkinson, C.B.E.
W. R. Ormandy, D.Sc.
R. B. Pilcher.
A. F. Rae.
Dr. E. C. B. Wilbraham.

Sir William Pope, F.R.S., Mr. E. V. Evans, and Dr. C. A Keane were co-opted, representing the Federal Council for Pure and Applied Science.

Some Interesting Suggestions

During the evening some interesting suggestions were made for developing the activities of the club and making it better known. One member asked whether it would not be possible to secure more publicity in such widely read journals as THE CHEMICAL AGE, as he thought the value of the Press was not sufficiently recognised. The chairman remarked that while the committee had not thrown the meetings of the club open believing that that might sometimes militate against a free expression of opinion, they had received already very valuable publicity in THE CHEMICAL AGE, the editor of which, they would be glad to know, had been elected on the club committee, and in the review section of the Journal of the Society of Chemical Industry, whose editor, Dr. Tripp, was also present.

A suggestion that in view of the low subscription for so many club advantages, an entrance fee might be fixed was met by the objection that it might not assist the efforts being made to raise the membership to a thousand. The policy followed, Captain Goodwood pointed out, had been to give the fullest possible value for the lowest possible subscription.

Various proposals were made for organising meetings and entertainments in the club, and one that club dinners, with a popular outside speaker, should be arranged seemed to find general favour. The collection of a club library was held to be impracticable, and even unnecessary in view of the existing libraries at the chemical society and the Patent Office, but it was thought that the provision of a few good chemical dictionaries might be a real convenience to the members.

Manchester College of Technology

Evening Students' Chemical Society

THE eleventh annual general meeting of the Evening Students' Chemical Society in connection with the Manchester College of Technology, was held on Tuesday, October 26, the chair being taken by Capt. F. S. Sinnett, F.I.C. About 250 members were present.

The society was established in 1910, and has steadily increased until last year there were nearly 300 members. As a result of the society's exertions, several important concessions have been obtained for evening students both from the directorate of the college and from the Institute of Chemistry, and for these the society and the evening students generally have very largely to thank Mr. F. Roberts, the retiring secretary, who has held office for the last six years. It is anticipated that the membership for the present session will be largely increased.

The Chairman pointed out that as a result of the society's exertions and those of Mr. Roberts, arrangements had been made whereby an associate of the College (in chemical technology) could, by taking a year's post-associateship, become eligible for the final A.I.C. examination, and that there were only one or two colleges in England which had obtained the privilege. The following officers were elected : *President :* Prof. F. L. Pyman, D.Sc., Ph.D., F.R.S. ; *Vice-Presidents :* The Principal, Professor E. Knecht, Pl.D., F.I.C., M.Sc. Tech., J. Huebner, M.Sc., Tech. F.I.C., Capt. F. S. Sinnatt, M.B.E., M.Sc., F.I.C., A.M.S.T., Mr. F. Roberts ; *Treasurer :* Mr. C. A. Schobelt ; *Joint Secretaries :* Mr. C. D. Young, Mr. W. Brown ; *Committee :* Messrs. H. M. Crozier, F. Roberts, J. Kiernan, S. Rowbottom, S. Wier, H. Roberts and J. English.

Dyemaker's Fund Suggested

A paper on "British Dyes, their Development and their Relationship to the Textile Industry," was read by Mr. H. Briggs, M.P., before the Parliamentary Commercial Committee on Wednesday. Mr. Briggs referred to the Government Bill, which he said might, while safeguarding the dye-making industry, ruin the textile industry. To ruin the users would eventually ruin the dye makers. While disapproving of a subsidy or a protective tariff, he suggested a combination of the two. A tariff limited to 10 per cent. might be put upon all imported dyes, and the proceeds provide a fund to assist the dye-maker.

Emil Fischer Memorial Lecture

By Dr. M. O. Forster, F.R.S.

On Thursday, October 28, Dr. M. O. Forster, Director of the Salters' Institute of Industrial Chemists, delivered before a well-attended meeting of the Chemical Society the Emil Fischer memorial lecture. Sir James Dobbie occupied the chair.

Biographical details of the life and work of Fischer formed the opening chapter, and the lecturer conducted the minds of his hearers from the simple personalities and commonplace facts relating to the life story of a man to the abiding results in chemistry obtained by a great scientist. After dealing at some length with a description of Fischer physically and mentally, and making reference to his early work, Dr. Forster comprehensively reviewed Fischer's life work as a scientist.

Carbohydrates, Glucosides and Depsides

Fischer entered the field of organic chemical research at the opening of its brightest epoch, said the lecturer. Even forty years ago, when the boundaries of organic chemistry were comparatively limited, the discovery of an entirely new class of highly reactive compounds by a novice must have been recognised as a portent.

In the year 1886 chemists recognised two aldohexoses (glucose and galactose), two ketohexoses (fructose and sorbose), and one aldopentose (arabinose); three hexobioses (sucrose, lactose and maltose) were also known to be definite individuals, and one hexotriose (raffinose). The general structure of glucose and galactose as that of straight-chain pentahydroxyaldehydes, and of fructose as a pentahydroxyketone, also unbranched, had been determined by the work of Kiliani, who relegated to its proper position as a tetrahydroxyaldehyde the pentose, arabinose, erroneously classified by its discoverer as an isomeride of glucose. In these few lines may be summarised the exact knowledge of crystalline carbohydrates at the time when Emil Fischer approached the subject.

His discovery of γ-methylglucoside, and the consequent recognition of cyclic relations distinct from that occurring in α-and β-glucose, have opened the way to a multitude of contingent isomerides, those of *d*-glucose alone numbering ten. Thus Fischer not only elaborated his own sugar chemistry, but he added to this the foundation of a new carbohydrate classification, the development of which will continue to inspire the prosecution of inquiry by generations following his epoch.

The instrument which enabled Fischer to bend his experimental deftness and his theoretical penetration to the purpose of elaborating so delicate a structure was phenylhydrazine. In 1884 he found that with this agent glucose and fructose yield phenylglucosazone, $C_{18}H_{22}O_4N_4$, whilst an isomeride arises from galactose; under similar conditions, maltose and lactose resemble the hexoses, forming individual isomeric osazones, $C_{24}H_{32}O_9N_4$, whilst sucrose, at first indifferent, gradually undergoes partial hydrolysis, generating phenylglucosazone from the products of inversion. Closer study showed that this reaction has the peculiarity of presenting a fully hydrogenised compound, phenylhydrazine, in the light of an oxidising (dehydrogenising) agent. The first product is the phenylhydrazone, which, owing to structural difference between glucose and fructose, is not the same from both sugars; a second molceule of phenylhydrazine now removes hydrogen from the two phenylhydrazones, yielding two structurally different phenylhydrazones of glucosone, which then undergo condensation with a third molecule of phenylhydrazine to produce the osazone.

$$HO{\cdot}CH_2{\cdot}[CH{\cdot}OH]_3{\cdot}C(:N{\cdot}NHPh){\cdot}CH:N{\cdot}NHPh,$$

common to both.

Elaboration of Polysaccharide Molecules

With so constructive a mind and an armoury of synthetical method so full of weapons, the magnetic problem of elaborating polysaccharide molecules was not likely to be neglected by Fischer. The individuality of *iso*maltose, produced by the action of cold fuming hydrochloric acid on glucose (1890 and 1895), was actively criticised; indeed, it was shown later by E. F. Armstrong that although *iso*maltose is formed in this process, it is accompanied by maltose. Subsequent attempts, however, were based on unassailable foundations. The first of these, in association with E. F. Armstrong (1902), depends on the action of β-acetylchloroglucose on the sodium derivative of galactose, and of β-acetylchlorogalactose on the sodium derivatives of glucose and galactose, the resulting disaccharides forming osazones. The galactosidoglucose closely resembled melibiose in its behaviour towards enzymes and the less delicate chemical agents, but the glucosidogalactose was distinct from lactose; all three resembled the β-glucosides in being hydrolysed by emulsin. From β-acetylbromoglucose and silver carbonate there was produced the octa-acetyl derivative of a disaccharide called *iso*trehalose (Fischer and Delbrück, 1909) from its close resemblance to the carbohydrate which is found in many fungi, and which appears to play in these the part of sucrose in chlorophyllaceous and starch-bearing plants; application of this method to acetylbromolactose gave distinct evidence of a tetrasaccharide being formed (1910), but this compound was not defined.

Tannins

The history of the tannins, said Dr. Forster, dates from the eighteenth century, but from the standpoint of this review the earliest year of importance is 1852, when Strecker deduced the formula $C_{27}H_{22}O_{17}$ for gallotannic acid or gall-nut tannin, which he regarded as a compound of grape-sugar and gallic acid in the molecular proportion 1 : 3.

Fischer synthesised digallic acid in 1908 and found it to be crystalline, although astringent; moreover, in 1912, having adopted a method of purifying the principal constituent of Chinese tannin and of producing specimens having constant optical activity, he and Freudenberg proceeded to show that when hydrolysed with sulphuric acid it yields 7 to 8 per cent. of glucose, an amount which they regarded as probably too low in view of the extended period occupied in completing the operation. They then expressed the opinion that the principal constituent of tannin is not a glucoside, but a sugar ester comparable with pentabenzoylglucose, in which the acyl group is that of digallic acid.

At the time of making this very penetrating speculation, they synthesised pentagalloylglucose, which they found to be a tannin, not identical with gall-nut tannin, but resembling it closely in taste, solubility, amorphism, optical activity, and feeble acidity; moreover, it precipitates gelatin and alkaloids, becomes gelatinous with arsenic acid, and develops colour with ferric chloride. In the course of this investigation they prepared hepta(tribenzoylgalloyl)-*p*-iodophenylmaltosazone, a freak molecule of gigantic dimensions (M.W. 4021), vastly exceeding those of any other synthetic product.

Valuable as the use of methylcarbonato-derivatives had proved, it did not suffice to perfect the aim in view, namely, to synthesise the main principle of Chinese tannin. This was accomplished in 1918.

Purine Derivatives

Some of the most notable figures in chemical history have devoted themselves to the problems which cluster round uric acid and its allies. Scheele, Bergmann, Fourcroy, Prout, Liebig, Mitscherlich, Wöhler, von Baeyer, Strecker, Stenhouse, and Gerhardt are found in the list of names connected with the subject, and to a high place of honour in this galaxy Fischer is most assuredly entitled. Between 1881, when he resolved caffeine into methylcarbamide and dimethylalloxan, and 1914, the year in which he synthesised a nucleotide in the form of theophylline-*d*-glucosidephosphoric acid, the literature was enriched by a succession of systematic observations, which reached a climax in 1898, when he derived purine from uric acid by means of indirect deoxidation.

Amino-Acids, Polypeptides and Proteins

The amino-acids bear to the proteins a relationship recalling that of a hexose to a polysaccharide. Accordingly, it was with those materials that Fischer began, in 1899, experiments which were destined to reveal the chemical nature of the proteins themselves, and to furnish material which indicates, at least, the manner in which lifeless protein may ultimately be synthesised.

By suppressing the basic aspect of the amino-acids, and thus encouraging their capacity to form recrystallisable salts with the natural alkaloids, strychnine and brucine, Fischer and his collaborators first resolved into their antipodal components the *dl*-forms of alanine, *a*-aminobutyric acid, leucine, *a*-amino-*n*-caproic acid, phenylàlanine, tyrosine, aspartic and glutamic acids, valine, serine, *iso*serine, and proline. The device by

which this was effected consists in benzoylating (1899), formylating (1905), and, in the case of serine, *p*-nitrobenzoylating (1906) the amino-group, resolving the *dl*-acylamino-acid by recrystallising its salts with strycnine or brucine, and hydrolysing separately the antipodal benzoyl, formyl, or *p*-nitrobenzoyl derivative of the *d*- and *l*-amino-acid. In this matter were accumulated, in greater quantity and variety, optically active units, which thus became available as building materials for the construction of polypeptides approaching the peptones in physical characteristics.

Technology

Fischer's relationship to the chemical industry was intimate and beneficent. Viewed superficially, the subjects on which is founded his unrivalled reputation as an investigator do not appear to have much bearing on factory problems; but the value of a life-work cannot be estimated with accuracy unless the qualities of the worker are taken into account. It is a common observation that absorption in laboratory practice, coupled with unremitted study and theoretical reflection, tend to draw the chemical investigator so much away from practical affairs as to diminish his perception of commercial and industrial factors. Either because of his early training, or owing to his inborn love of knowledge in all its branches, Fischer was unusually free from this disability, and the reliance placed on his opinions by leaders of the German chemical industry ultimately grew into an attitude of trust which was quite exceptional.

A German Gentleman

At the conclusion of the lecture Dr. Crossley proposed a vote of thanks to Dr. Forster, and, in doing so, bore eloquent testimony to the scientist, who, in private life, was a German gentleman, and in his laboratory the austere professor. He said Fischer had a magnetic personality, but, although a great chemist, was not so great as a teacher in the laboratory because he was impatient to arrive at truth, which impatience he extended to his pupils, who also became impatient. Nevertheless, austere as a professor, Fischer was the most charming of hosts, and a master of all subjects.

Professor Armstrong seconded the vote of thanks, and quietly remarked that he met Fischer nearly forty years ago. He considered Fischer to be a German gentleman of the first water. Not only was he unlike his fellow Germans, capable of appreciating us, but the Germans appreciated him as was shown by the offer made to him by his Government to leave his comparatively secluded laboratory and enter the Berlin circle of public notoriety and limelight with a salary of £5,000 a year—an offer which Fischer refused. Fischer's work could not be fully appreciated at the present, but that would come in time.

Dr. Forster responded to the vote of thanks. He pointed out that what Dr. Crossley and Professor Armstrong had said about Emil Fischer as a German must not be misunderstood. If he was austere he was also kind, if he was a slave-driver the slave he drove the hardest was himself. He was certainly a German, a Rhinelander, but not, as might be inferred from a comment of Dr. Crossley's, a Prussian. Fischer was neither a Prussian by birth nor a Prussian by character. He did not love aggrandisement, neither was he conceited. When he might have been honoured by the nobility of Germany he chose the company of his own students and family friends.

W. H. Smith & Son's Centenary

The dinner held at the Savoy Hotel, London, on Wednesday, October 27, to celebrate the centenary of the formation of the business of W. H. Smith & Son marked a unique occasion in the history of the printing and publishing trades of Great Britain. Viscount Burnham outlined the story of the growth and present multifarious activities of this immense business to a very distinguished gathering (including Mr. John Douglas, a director of Benn Brothers, Ltd.), representing the various trades and professions with which W. H. Smith & Son are connected. Viscount Hambleden, a grandson of the founder of the firm, paid a great tribute to the memory of his father and grandfather, and mentioned that at the present time the firms bookstalls handle 23 London daily papers and between 500 and 600 London weeklies, in addition to 75 provincial publications, and that something like 20 tons of books and magazines are issued daily from the central buildings in London.

Chemical Engineering

Some Gas Works Problems

THE new President of the Midland Junior Gas Association is Mr. W. J. Pickering, gas chemist (Midland Section Society of Chemical Industry) and superintendent of the Coal Test Works, Birmingham Gas Department. In his Presidential Address on Thursday, October 28, before a full attendance of members, he pointed out that chemical plant on gas works tended, and rightly so, to increase in extent, and at many works junior chemists had definite duties on such plants. He knew of some medium-sized works where the ammonia washing and scrubbing plant was directly under the control of a junior, and good results as regarded efficiency of washers and strength of liquor made for sale were achieved. Whatever the plant might be, a measure of responsibility in this way should be welcomed.

The field for the engineering chemist on modern works was of increasing importance, and several problems which had a bearing on this particular question could be mentioned. Oxide purification was an instance where little change in apparatus and methods of working had taken place for many years. The purifier box had remained almost as it existed to-day for more than 50 years, and the question of the use of oxide of iron for H_2S removal was one which was not, even yet, fully understood in all details. A fair amount of careful and fairly successful research was carried out prior to the war, on methods of liquid purification of gas, and work on those lines would no doubt be proceeded with as opportunity offered. Valuable ground space would be saved by a reduction in the number of purifier boxes, and cost of purification would be reduced as regarded labour required for box changing.

Naphthalene Troubles—Scope for Investigation

Naphthalene troubles had afforded considerable scope for the gas works chemist, as careful investigation was necessary before any particular method of cure or prevention was adopted. Regular testing by way of supervision was also essential to secure proper working efficiency of whatever plant was installed. The problem had cropped up in slightly different form during recent years owing to the "stripping" of gas for extraction of crude benzol, which had thereby reduced the "hydrocarbon content" of the gas, and also by reason of the fact that gas leaving the works had been, generally speaking, at a higher temperature owing to the larger volume of gas made per unit of carbonising plant. It would seem that the best method ultimately of dealing with the naphthalene problem would be by way of removal of the naphthalene at as early a stage as possible on the gas stream. Dr. Carpenter's method of "shock-cooling" the gas in specially-designed water-cooled condensers, and at the same time washing the gas with thin tar was modern practice in this respect. The naphthalene question was aggravated by deposits of the crystalline compounds in the mains on many large works, and until those were removed, methods of washing or spraying the gas with "cold" solvents would need to be continued in order to prevent the gas picking up and carrying forward naphthalene from those deposits on to the district.

Recording instruments for indicating both pressure and quality of gas were an important feature on most large works, and the care of those usually fell to the chemist. Properly looked after so that their readings might be relied upon, those instruments were of undoubted help to the engineer, but regular supervision and checking was very necessary. The installation of instruments recording calorific value and specific gravity on works streams of coal gas and water gas would give timely indication of fluctuations in gas quality; and occurrences in the retort house and elsewhere which might otherwise not be detected until more time had elapsed could be quickly dealt with. It was very probable that, in the near future, instruments of that nature would be placed out at certain points in the distribution area, under the Gas Regulation Act, and very useful data should then be forthcoming.

In consequence of the carter's strike 250 employees at William Oldroyd & Sons' (Ltd.) glue works, Woodhouse Carr, Leeds, were thrown out of employment last week-end. The firm had plenty of work in hand, but could not continue business owing to inability to get stocks of raw material from the station.

British Association of Chemists

Annual Meeting in Manchester

THE third annual meeting of this Association was held at the Midland Hotel, Manchester, on Saturday last Mr. William E. Kay presided in the absence through ill health of Professor Hinchley, the President. There was a very large attendance of members.

In opening the proceedings the Chairman expressed his deep regret at the absence of the President, though he was gratified to be able to report that Professor Hinchley now appeared to be well on the way to recovery.

The annual report of the Council was read and adopted, and the report of the hon. treasurer (Mr. A. G. C. Paterson) submitted. The Chairman pointed out that though the Report showed a perfectly satisfactory state of affairs, the members must anticipate a much greater expenditure in the future. Touching upon the same point Mr. F. Scholefield thought it would be advisable to raise the annual subscription from one guinea to two guineas.

All the officers were re-elected, and the vacant post of vice-president was filled by the appointment of Dr. T. T. Best, F.I.C.

The Work of the B.A.C.

The Chairman, in speaking of the work of the B.A.C. in the past, and the prospects of extending its sphere of usefulness in the future, said that what they were all out for was to form a model union. They had been pioneers in the work of co-ordinating the interests of chemists in general, and had happily been able to effect considerable improvement in their professional and economic status. An enormous amount of propaganda work had been done, which he, personally, was convinced would eventually bear good fruit. Their Council could do nothing of itself; the whole spirit of the B.A.C. was that it worked through its local sections.

The Peterson Judgment

One of the subjects of general interest to their profession which would have to be considered in the immediate future was a legal re-definition of the term "chemist." They would all be acquainted with the decision of Mr. Justice Peterson, in the King's Bench Division, respecting the action taken against the Pharmaceutical Society by one of its members, the result of which decision was to restrain that Society from acting outside the range of the powers authorised by its charter. That decision touched two aspects which were of great interest to the members of the B.A.C. One was that it was *ultra vires* for the Pharmaceutical Society to deal with the relationships between employer and employed. They had been endeavouring to act as a trade union of employers. The popular impression of a trade union was that it was composed merely of employees, but it was quite possible to form one of employers also. The B.A.C. hoped to fill both positions, and to serve both sides, because it was not possible to have regard to the interests of the one without due recognition of the fact that equal consideration must be paid to the needs of the other. The second aspect was that it had been proposed to form a Council of the nature of a Whitley Council, and it was also declared that by forming this Council they also exceeded the powers of their charter. The formation of guilds would become a very important function of the B. A. C., because the guild was the predecessor of the Whitley Council, if it was nothing else.

In concluding his opening statement the Chairman referred to the advice of Lord Moulton that chemists should unite and maintain a high standard, both in chemistry and in chemical industry; there would then not only be a brilliant future for them industrially, but an enhancement in the respect which was paid to their profession by the nation. (Applause.)

Guild of Dyestuff Chemists

Mr. WILSON (Huddersfield) enquired whether progress had been made in the formation of a Guild of Dyestuff-making Chemists.

The CHAIRMAN explained that a sub-committee of the Council had been formed, composed of Manchester and Liverpool members, whose function it was to prepare bye-laws, which were now drafted and awaiting further consideration, and to take the preliminary steps for forming a Guild of Textile Chemists and a Guild fo Dyestuff making Chemists.

Mr. WILSON said there were immense possibilities for the formation of a Guild of Dyestuff-making chemists in the Huddersfield district. Would it not be as well for the Council to increase the subscription to two guineas and to fix a time limit at which that subscription would be increased still further, because there were a large number of chemists who were waiting to see how the B.A.C. went on before they definitely put their money down. He thought it was only fair to the original members to take such a course.

Minimum Salaries

Mr. H. E. J. CORY (London) referred to the question of £350 minimum salaries. Any increase upon that amount would depend upon the ability of the individual. There appeared to be no provision for the grading of trained chemists and the establishment of satisfactory minima for their various grades. He concurred in the view that in the future the B.A.C. would require more members and more money. Their object was to place the B.A.C. on a par with the medical associations and similar kindred bodies. A guinea subscription was not sufficient. Many members of trade unions, by their weekly contributions, were paying much more to their organisations. Surely they, as a professional body, could do much better.

Mr. W. MILLINGTON (Liverpool) agreed that all the B.A.C. could do was to help the chemist to do something for himself, and therefore the chemist must be willing and eager to do something for himself. The term "chemist" required further re-definition because legally the pharmaceutical chemist was the only individual who could apply it to himself. They had already 400 new members, and he hoped that by the next year they would have a membership of at least 2,000. Another 800 guineas would enable them to do considerably more work, and he urged upon those present to endeavour to induce others to join the B.A.C.

Mr. SCHOLEFIELD said they could only raise their professional status by raising their economic status. The present minimum salary standard of £350 only represented £150 pre-war value.

The CHAIRMAN: £110.

Mr. SCHOLEFIELD said he would strike an average, and call it £120. This was certainly not adequate. The Council of the B.A.C. had already done good work in bringing about increases of salaries to chemists in Glasgow. A good idea would be to appoint a paid organiser, not at £350, but double that amount. He thought they should not be afraid of raising subscriptions. Another point was that the allowance in respect to income tax abatement was inadequate and should be considerably increased, and a further question which should be settled was whether subscriptions paid to the B.A.C. were liable to income tax assessment. Personally, he disliked the term "guild," and preferred the designation "group." There was ample scope for employment bureaux and the establishment of benevolent funds. When Whitley Councils were formed they should endeavour to secure representation upon them of the brain workers in the industry from the point of view of the chemist.

A suggestion was put forward that the subscription might be increased to two guineas in November, 1921, and further increased in 1922 to four guineas.

Mr. F. SCHOLEFIELD proposed, and Mr. POMPHREY seconded, "That this meeting requests the Council to take into immediate consideration the question of an immediate increase in the yearly subscription of members."

Benevolent Fund

The question of the Benevolent Fund was further dealt with by Mr. Yarrow (Manchester).

The CHAIRMAN said it was quite within the scope of the Association to make a levy up to 25 per cent. of the subscription. The Council had before them a draft of a scheme based mainly on voluntary subscriptions. The draft would be discussed at the next Council meeting and probably a specific scheme put forward. The subscription question was a difficult one to solve.

It was eventually agreed to leave the matter of increased subscriptions to the further consideration of the Council.

In respect to a point of a graduated scale of salaries raised by Mr. Scholefield, the Chairman said it was possible there might be difficulty in getting chemists to group themselves in various grades for the purpose of ascertaining the salaries they should be paid.

Profiteering in Soda

Total Fines £475 and 45 guineas costs

At the North London Police Court on Friday, October 29, before Mr. Clark Hall, the hearing was concluded of summonses against Mr. L. G. Collins, manager of Messrs. A. G. Collins & Brother, chemical and soda manufacturers of Shamrock Works, Dumballs Road, Cardiff. In all twelve summonses were issued against the defendant, at the instance of the Board of Trade, under the Profiteering Act. It was alleged that the defendant had sold soda at a price which was unreasonable in view of all the circumstances. Mr. Travers Humphreys appeared for the Public Prosecutor, and the defendant was represented by Mr. G. C. Kingsbury.

The prosecution arose as the sequel to a complaint investigated some months ago by the Complaints Tribunal of the Central Committee in London. The complaint was lodged by a retailer named Mr. A. Coward, of Tyrell Road, East Dulwich, who called attention to the price he was charged for soda crystals by Messrs. J. Manger & Sons, Ltd., salt and soda manufacturers, of High Street, Kingsland, N. Messrs. Manger & Sons, Ltd., stated that they only made a reasonable profit on the soda they sold which they in turn had obtained from the defendant. In the present proceedings the prosecution suggested that 10s. a ton was sufficient for a middleman to make on a ton of soda, while the defendant had handled soda at very much bigger profits.

Mr. G. Butler, sales manager to Messrs. Brunner, Mond & Co., Ltd., was recalled and questioned with regard to the export price of soda in the early months of the present year. He stated that the same price was charged for soda for export as for soda intended for home consumption. Soda for export was packed in kegs instead of bags, and a little extra was charged for the packing.

The Defendant's Evidence

The defendant then gave evidence. He admitted that in February of the present year he sold Messrs. Manger 17 tons of soda on which he made a profit of 10s. a ton. That was the gross profit, but the net result to the firm was a loss of about 9 per cent. In March he received a further enquiry from Messrs. Manger, and thought that they required soda for export. It was usual in the trade, when soda was required for the home market, to state the fact. If Messrs. Manger had asked him for soda for the home trade he would not have sold to them. At the material date the price of soda ranged from £12 to £16 a ton, and at one period he saw some offered at £18 a ton. He understood that the Government were encouraging export at high prices. In order to obtain soda, his firm communicated with practically all the sellers in the United Kingdom. On an average they wrote about 200 letters before they obtained one order. At the present time it was necessary in business to make a gross profit of at least 33 per cent.

The Magistrate: In order to make 5 per cent. net you have to make 33 per cent gross profit?—Something like that.

The defendant further stated that on the second transaction with Messrs. Manger when 20 tons of soda were supplied he estimated that he made a net profit of only about 6 per cent. Subsequently the defendant qualified his figures, and said that on his first transaction with Messrs. Manger & Son there was a loss of about 10 per cent., while on the second transaction the net profit was about 16 per cent. The second transaction resulted in a profit of £41 7s., and the two sales showed a net profit of about 7 per cent. When writing to the Complaints Tribunal he stated that his firm were going out of business, and that was correct. They had sold the lease of the premises. When they sold the premises they did not charge anything for the goodwill.

In cross-examination the witness admitted that on August 7 he wrote to the Complaints Tribunal saying: "At the time we sold the goods it was very necessary that we should make all the profit that we could." The witness admitted that he was made bankrupt in 1910, and had never applied for his discharge.

You have stated that this was a gamble?—I said so to the Tribunal, but I have seen fit to reconsider it.

Was it a speculative transaction?—It was.

In further cross examination the witness admitted buying soda from Messrs. Brunner, Mond at £5 10s., and reselling at £11 a ton.

B.C.T.A. called for Defence

Mr. A. F. C. Bromfield, secretary to the British Chemical Trade Association, was also called to give evidence for the defence, and was asked if the ruling price in the home market was the same as the ruling prices for export. He replied in the negative adding that they were two totally different things. He pointed out that the home market was a matter for the manufacturers entirely.

Counsel: Do you really know anything about the home trade? I know very little about it.

In further cross-examination witness said he did not know that there was a shortage of soda crystals for the home trade and he did not agree with the evidence which had been given by the representative of Messrs. Brunner, Mond & Co. He would not say there was plenty of soda for the home trade, but there was not a shortage. He had heard that Messrs. Brunner, Mond & Co. and the United Alkali Co. had rationed their customers. He did not know that owing to the action of speculators soda had been sold at very high prices.

Mr. Travers Humphreys: If that is so, I will not trouble you anv further.

Judgment

The magistrate said that the case was of very serious public importance, and although it had taken a considerable time to try, there was very little dispute as to the facts. The defendant had given his evidence in a very fair way. Six of the summonses would be dismissed. It had been argued that it was a sale for export and therefore did not come under the Profiteering Act. He was, however, quite satisfied that the case did not come within the exemption allowed by the Act. The defendant did not make any enquiries as to the purpose for which the soda was being sold. The sale did not come within another exemption of the Act as there was in no sense a competitive tender. He had also been asked to say that the percentage of profit did not exceed the percentage made on similar articles sold before the war. That contention was not in any way borne out by the evidence. In that direction the defendant was very frank and did not contend for a moment that he sold soda crystals for the home trade before the war at anything like the same rate of profit. According to his own statements he was making a different profit. That being so he thought the case undoubtedly came within the mischief aimed at by the Statute.

On March 18th when the defendant had received an enquiry from Messrs. Manger & Sons he had already purchased 24 tons of soda at an average price of £6 5s. a ton. He asked just double that price from Messrs. Manger & Sons, the would-be purchasers. The only excuse for that very large gross profit of 100 per cent. was that the would-be vendors from whom he was purchasing might not deliver. That was a curious excuse for what, to the magistrate's mind, was an outrageous overcharge to Messrs. Manger & Sons. Soda crystals were manufactured by Messrs. Brunner, Mond & Co., who had the entire cost of buying the raw material, that of manufacture, and all the establishment charges were borne by them. They sold at £5 10s. a ton and the defendant was asking him to say that although he did nothing to enhance the value of the article and in fact disposed of it without having seen it, he was entitled to ask for himself a similar sum to that which Messrs. Brunner, Mond & Co. asked for the entire manufacture and production. He was bound to say that such a demand could not possibly be justified and in fact it was profiteering. If a business could not be carried on without profiteering then the business must cease. If it did cease it was no loss to the public in any way.

The magistrate also thought that the prosecutors were perfectly justified in taking out the number of summonses they had. He felt it was his duty, although he sympathised with the defendant, to inflict a very substantial punishment. On the first summons there would be a fine of £100 and ten guineas costs, and on each of the other summonses a fine of £75 and seven guineas costs.

Mr. Kingsbury appealed to the magistrate not to inflict such heavy fines, and pointed out that the profit made on the transaction was only about £40.

The magistrate: I don't feel that I can conscientiously depart from the decision I have come to. It is necessary in these cases that the defendants should pay a heavy pecuniary penalty.

Mr. Kingsbury asked if leave to appeal was necessary and the magistrate replied that the defence had that right and he would grant time for the fines to be paid.

Society of Chemical Industry

London Section

MR. JULIAN L. BAKER presided at the first meeting of the session of the London Section of the Society of Chemical Industry, which was held at the Institution of Mechanical Engineers on Monday last. The main item for the evening was a lecture by Sir William Pope, President of the Society, on "The Photography of Coloured and of Distant Objects."

Questions of Policy

Sir William Pope, before giving his lecture, dealt with one or two matters affecting the Society. He drew attention to the existence of the Federal Council for Pure and Applied Chemistry, which was composed of nominees from about 20 societies concerned with the chemical industry. The Federal Council, he said, had for its object the treatment of all those chemical interests which were common to the great body of chemists as a whole, but which could not be said to be the particular care of any one society more than another. The great need of the chemical industry was the provision of a commodious central house, with meeting rooms, library, facilities for assisting the younger members of the profession, and also an organisation for the preparation and publication of chemical works of a collective character. In addition, there was required a useful and convenient scheme for the publication of such works. Such a scheme would involve an expenditure of something like £500,000, and the Federal Council had devoted a great deal of time and attention to the whole question. In this they were fortunate in having the leadership of Lord Moulton.

With regard to the finance of the proposal, it had even been suggested that they should apply to the State for money, on the ground that the State helped those who helped themselves, but he did not doubt that most of them felt they should exhaust all other sources of finance before they attempted to dip into the public purse.

Sir William Pope also referred to the financial position of the Society itself, and said that the only means by which a further increase in the subscription could be avoided was to secure new members and to enhance still further the usefulness of the *Journal*. The whole question of the publication scheme was now before the Federal Council, and the large chemical societies would shortly be invited to confer on the possibility of some sort of co-operative publication scheme.

He would also like to refer to the one activity of the Federal Council which had been carried to a successful issue. Following our example, practically all the Allies had formed their own Federal Council for chemistry, and these had now become federated as one large international organisation, which held its first annual meeting in June in Rome.

Photography of Coloured Objects

SIR WILLIAM POPE then delivered an address on "The Photography of Coloured and of Distant Objects." He said the ordinary photographic plate is sensitive only to blue and violet light—namely, to light of short wave lengths; such a plate receives the same impression of a particoloured scene as we should receive on viewing it through deep blue spectacles. This particular limitation of the sensitiveness of the photographic plate results in the yellow narcissus and a bright red rose appearing black, and the deep blue violet white, in the finished photograph.

Vogel showed in 1873 that the photographic plate could be rendered sensitive to light other than blue by incorporating certain dyestuffs with the sensitive film, and this discovery was greatly extended by Waterhouse, who, in 1875, showed that the dyestuff eosin rendered the plate sensitive to green and yellow light. This discovery acquired great practical importance when the Germans introduced pinaverdol (sensitol green) and pinacyanol (sensitol red) as bathing agents; the use of these dyes made the plate more or less sensitive throughout the visual spectrum. Until the commencement of the war the whole of these materials were supplied by the German colour firms, and when war broke out methods for preparing the important sensitising dyestuffs were worked out by Dr. W. H. Mills and the speaker. The whole of the above dyes used in the photographic services of the Allies during the war were made in the Cambridge University Chemical Laboratory.

Colour Diffused in Air

A number of lantern slides were shown in demonstration of the advantages attaching to the use of photographic plates which have been rendered sensitive to visual light of all colours; such plates are indispensable in the correct representation of coloured objects in monochrome, in the reproduction in colours of coloured scenes by the various photographic printing methods, and in the circumvention by means of air photography of camouflage colour schemes. It was demonstrated further that light of different colours is diffused to differing extents in the air; thus, blue light, to which the ordinary plate is alone sensitive, has relatively little penetrating power in air, and that a distant scene appears steeped in mist when photographed on the ordinary plate. Red light, on the other hand, has great penetrating power in air; the distant scene is thus rendered in great detail when photographed on a specially sensitised plate by aid of the red constituent alone of daylight.

The experience gained in this country during the war with the preparation and applications of sensitising dyestuffs made it possible to manufacture a so-called panchromatic photographic plate which is more sensitive to red than to blue light; this plate was largely used in air reconnaissance photography, because of its great air penetrating power and its great rapidity.

Lack of Commercial Ability

DR. C. A. KEANE proposed a vote of thanks to Sir William Pope for his lecture, and, as one of the representatives of the Society of Chemical Industry on the Federal Council, called attention to the need for unity in chemical effort in this country. He knew there were many who thought that the matter of a central house had moved extremely slowly, and that they ought long ago to have seen the foundation and probably some of the bricks rising of that edifice. The times, however, had been very difficult, and he asked them to bear with the Federal Council, and Sir William Pope, as President of it, a little longer, when it was hoped that some definite step would be put forward which would meet with definite support.

PROFESSOR H. E. ARMSTRONG, F.R.S., who seconded the vote of thanks, said that the great drawback of the chemical industry in this country was not on the technical side, but in a lack of commercial ability. There had been a great deal of talk about our downfall on the scientific side, but he wished to drive it home as hard as possible that the downfall was not on the scientific side, but on the commercial side. The dyestuffs industry was doing nothing in this country simply through lack of commercial ability and through lack of development of the proper commercial organisation. There were any number of chemists, but there was disunion in the works. There was Board of Trade interference, which was, perhaps, the worst feature of all, because the Board of Trade had no understanding whatever of the scientific side, and it was very doubtful if they had any understanding of the commercial side.

Nottingham Section

SOME interesting facts relating to the industry of animal waste products were given by the Chairman, Mr. J. H. Dunford, in his inaugural address. The maintenance of a moderate price for meat largely depended, he said, upon the efficient use of these products which were in themselves of great value and largely irreplaceable by any others. For example, the blood and other fertilisers had not only a high nitrogen content, but, apart from this, they were valued more highly than chemical fertilisers on account of their humus. Blood charcoal had proved to be one of the best absorbents for deleterious gases, and as such was much used during the war in the case of gangrened wounds. Blood serum was drained on sieves, treated with about 1 per cent. of turpentine, which preserved it and favoured sedimentation, then heated from 122° to 212°F., kept at 100°F. for two hours, and gave blood albumen used in the leather industry.

The lecturer recapitulated the numerous active principles, such as leuthin pituitary, &c., used in medicine, including laudine from wool, and surgical ligatures from the intestines. The direct use of horn and bone in the manufacture of toothbrush handles, dice, &c., was before the war largely a German industry, and was also carried on by Du Ponts in France.

The utilisation of camp waste during the war developed into a very important industry whereby sufficient glycerine was saved to supply the propellant for over 14 million 18-pounder shells. The full use of the bones lead to several of the products —animal charcoal, grease, bone meal, glue, bone ash, superphosphate, phosphoric acid, besides others not described. The closed benzene extractor had replaced the former offensive open-steaming process. The loss of benzine (80°-120°) only amounted to about ½ per cent. of the weight of material treated. The benzine was distilled off at a temperature which should not require to be higher than about 120 degs. The residual grease was treated with sulphuric acid in lead-lined vats to remove lime. The degreased bones were steeped in dilute HCl and macerated with water and sulphur dioxide in order to soften and bleach them. The glue was steamed out until the nitrogen in the steamed bone fell to 1 per cent. or even lower. The steamed flour after drying for about three weeks was a valuable manure. About 80 per cent. should dissolve in 2 per cent. citric acid. Or it might be calcined for bone ash used in metallurgy or ceramics.

War Productions

During the war phosphoric acid made from bones largely replaced tartaric acid in baking powders. The demands of the Government for glue were met by direct contract with the bone-users' trade on thebasis of the amount of bone bought from the military camp committees.

Further details were then given of the glue manufacture. It was clarified with alum, bleached again with sulphur dioxide, and evaporated in vacuum pans to from 18° to 28° Twaddell. Glue so prepared sets more rapidly than that made by the older process in which the higher temperature partly destroyed the gelatinising power. The glue was dried in hot-air tunnels on string nets, or, better, on galvanised wire, as it was found that the strings were often eaten by rats. The kinds and use of glue were then described. Liquid and flexible glues often contained glycerine. For aeroplanes a special hide glue was prepared which contained 5 to 10 per cent. of phenol or a little ammonia. A good glue should not attract moisture. One cause of "dud" shells was the access of moisture to the bursting charge round the screw cap. This was remedied by dipping the cap in a good bone glue. Much glue was wasted by the addition of fresh glue to old remnants which had become attacked by bacteria. A real economy was effected by throwing away such residues.

A discussion followed in which the lecturer further stated that a very thin, penetrative, strong glue, known as "Scotch," was made from the horn pith or centre of horn. There were few good tests of glue apart from actual trial. A good glue should, however, absorb six to seven times its weight of water without liquefying, and the strength of the jelly might be tested by shot.

Grasselli Medal

DR. ALLEN ROGERS, of Pratt Institute, was presented with the Grasselli Medal at a joint meeting of the American Section of the Society of Chemical Industry and the New York Section of the Société de Chimie Industrielle on October 8. Mr. M. T. Bogert in his presentation address said the Grasselli Medal was established by the Grasselli Chemical Co. of Cleveland, Ohio, to be awarded annually for the paper presented before the New York Section of the Society of Chemical Industry, which shall, in the opinion of the medal committee, offer the most useful suggestions in applied chemistry. The committee of award, at its meeting September 17, 1920, voted unanimously to bestow the medal for this year upon the honorary secretary of the American Section, Dr. Allen Rogers, for his paper entitled "Industrial Uses for the Shark and Porpoise," printed in the *Journal* of the Society for January 31, 1920 (vol. 39, No. 2, pp. 9-10T.)

An Acknowledgment

IN our issue of October 2 last we published an article on "United States Potash Deposits," by Mr. H. D. Ruhm, with some comments on the subject. Inadvertently we omitted to mention that the matter was abstracted from the *Journal of Industrial and Chemical Engineering*, and are glad of the opportunity now of making good the omission.

Chemical Matters in Parliament

Mesopotamia Oilfields

IN reply to a question by Mr. Charles Edwards (House of Commons, November 1), Mr. Kellaway said that in regard to the present position of negotiations between this country and the United States over the Mesopotamia Oilfields, certain questions have been raised by the United States in regard to the general subject of concessions in mandated territories. Mr. Glanville asked whether the method of exploiting has yet been decided upon and received a negative answer.

Power Methylated Spirits

Asked by Mr. Jesson (House of Commons, November 1) whether he is aware that the completion of enough motor cars and lorries (3,000,000) in America this year is sufficient to absorb the world's output of petrol, Mr. Chamberlain said he was unable to affirm. The Government agree as to the importance of an abundant supply of cheap liquid fuel. He pointed out that provision was made in the Finance Act of this year for the payment in respect of spirits (whether imported or home-made) denatured in this country as power methylated spirits, of an allowance which would have the effect of cheapening production. Further legislative proposals are under consideration which will enable the Commissioners of Customs and Excise to modify the existing restrictions on the conditions of transport and distribution of spirits intended for use in making power methylated spirits so far as this can be done with due regard to the protection of the Revenue.

Natalite

Mr. Jesson inquired if the Chancellor of the Exchequer was aware that Natalite was during the war, and is now, used in South Africa as a motor spirit, and is cheaper than petrol; whether importation, with the same denaturant, into this country would be allowed; and, if not, the state of denaturant necessary to safeguard the interests of the Revenue Authorities (House of Commons, November 1). Mr. Chamberlain replied that he was aware of the use of Natalite in South Africa, but had no information as to price. Natalite may be imported, subject to duty, irrespective of denaturant, but plain spirits may be imported for use duty-free as a source of power, provided the differential duty has been paid, and on condition that after importation the spirits are denatured as power methylated spirits, in a manner approved by the Commissioners of Customs and Excise. The question of the denaturants to be prescribed for this description of methylated spirits is under consideration.

Exports of Cement

Replying to Major Prescott (House of Commons, November 1), Sir R. Horne said the total exports of cement from the United Kingdom for building and engineering purposes during the years 1913 and 1919, and for each completed quarter of the present year, together with the total value per ton for each of the periods are as shown below. The relation between output and exports is being carefully watched.

Period.	Quantity.	Value f.o.b.	Average declared value per ton.
	Tons.	£	s. d.
1913	747,736	1,273,080	34 6
1919	385,526	2,050,336	106 4
1920—			
1st Quarter ...	130,771	713,370	109 1
2nd ,, ...	149,770	848,547	113 4
3rd ,, ...	174,055	1,078,847	124 0

Women and Lead Processes

After considerable discussion it was ordered that the Women and Young Persons (Employment in Lead Processes) Bill be read a second time (House of Commons, November 1). Clause 1 in the Bill deals with the use of lead in certain processes only. Clause 2 deals with lead in all processes, including lead in pottery work. Referring to Clause 2 Major Hills said he believed all these regulations have been in force for many years in our pottery works, and certainly the effect of the regulations in diminishing the evil of lead poisoning has been great. That has been especially the case as it affects women. The effect on women is far worse than on men. Mr Wignall

said "Especially I welcome the provision in the schedule that women or girls under 18 years of age ought not to be employed in any place or factory where lead is in use. I have had some experience of the dreadful ravages of this disease. The many precautions adopted under the Acts that have been passed for preventing lead poisoning have to a considerable degree reduced the terrible effects, but there are still evils existing. Any person knowing anything of the evil consequences of lead working in any department, especially in the furnaces for the smelting or manufacture of lead, must welcome any legislation of this character. I know there always will be certain neglect on the part of the workpeople themselves. We have provisions for the erection of baths and various cleansing places, but they are very often neglected by the people most concerned. I would emphasise the importance of enforcing the application of the remedy both on the employer and the workpeople. Unless some power is given to compel the employers to provide and the workers to use the remedy provided, I am sure the Bill will not be of real service. . . ."

Nationalisation of Universities

VISCOUNT HALDANE is to address a meeting of the Old Students of the Royal College of Science on November 9. His subject, the "Nationalisation of Universities," is one which occupies the minds of many people in the chemical world to-day. Following as it does the paper read before the old Students' Association, at their last meeting, on the proposed University of Science, an account of which appeared in THE CHEMICAL AGE of October 16, the subject should arouse considerable interest. There is no doubt that the whole University system is slipping into the boiling pot, and the sooner it is right in and the whole matter is properly "cooked" the better it will be for the nation educationally. No doubt the Rt. Hon. Viscount will assist many of his hearers, not only in forming their opinions on the subject, but in convincing them and the community at large that it is high time to set things square, and true, so that the greatest good may be derived by many thousands of waiting students eager for the battle of intellectual efficiency and supremacy. The meeting is to be held at the Imperial College Union, Prince Consort Road, South Kensington, S.W., at 8 p.m., preceded by a informal dinner, at 6.30 p.m. The address will be followed by discussion in the usual way.

Sugar Bait for Disease

MEDICAL scientists use a certain sugar for detecting the presence of typhoid. The germs are so fond of it that they readily collect together and multiply at the spot where the sugar is located and are easily detected. Most of the rare sugars used for detecting disease were before the war products of Germany, but according to latest reports American manufacturers are now producing these costly sweets. Bacteriological or rare sugars require the utmost care in handling, for the presence of any impurities or of another kind of sugar renders them unfit for the precise purposes for which they are intended. This elaborate care is responsible for the seemingly enormous prices at which rare sugars are listed. High as these costs may appear they are said to yield only nominal profits to the manufacturer.

Cork Substitute

EXPERIMENTS have been carried out at a chemical works at Bruenn-Koenigsfeld in the anticipation of finding a substitute for cork. A *Times* report says tangible results have now been arrived at. According to a process which has been patented, turf can be treated in such a way as to furnish a material for insulation and building purposes, that in most respects is not inferior, and in some superior, to cork. The product is reported to be equally light, firm and sound proof, to possess great insulating properties, and to be damp proof. It can be manufactured at a much lower cost than the price at which cork is at present obtainable. Czecho-Slovakia contains a large amount of turf which can thus be turned to good account, and, since the manufacturing process has passed the experimental stage, a brisk export trade in the new article is prophesied.

National Dyestuffs Conference

AT a meeting on Thursday of the Executive Council of the Chemical and Dyestuff Traders' Association the following resolution was passed:—

"That in view (1) of the uncertainty and anxiety prevailing among manufacturers, distributors and users of dyestuffs regarding the provisions of the Bill the Government intend introducing to prohibit the importation of artificial dyestuffs except under licence; (2) of the desirability in the national interest of securing a system that, whilst accomplishing the end desired, is equitable and just to all concerned, and causes a minimum of inconveniences and detriment; (3) and of the obvious advantages arising from a scheme that would meet with general approval and support; the Executive Council of the Chemical and Dyestuff Traders' Association are strongly of opinion that a conference representative of all the interests involved should be convened at an early date, and respectfully request the Board of Trade to take the initiative in summoning and arranging for such a conference."

Yesterday (Friday), at Bradford, a meeting was held of the Dyes and Dyestuffs Sub-Committee, appointed under the Profiteering Act, to consider the condition of supplies, &c. Among the witnesses was Mr. H. Gilliat (E. G. Jepson & Co., Leeds), representing the Chemical and Dyestuff Traders' Association.

Exodus of Scientists

NO fewer than sixty-three members of the scientific staff of the American Bureau of Standards resigned during September. Among the number are people like the physicist in charge of the aviation instrument section, Mayo D. Hersey; Christian Nusbaum, associate physicist of the magnetic measurement section; A. H. Taylor, associate physicist, in charge of the photometry and illuminating engineering section; Samuel R. Parsons, associate physicist, of the aeronautic power plant section; Victor R. Gage, mechanical engineer, of the aeronautic power plant section; G. M. Williams, associate engineer, of the cement, sand and stone section; William B. Brown, associate physicist, of the aeronautic power plant section; Herbert M. Freeman, associate physicist of the radio section; and Albert B. Peck, associate physicist of the cement, stone and sand section.

Wages in Chemical Trade

AT a recent meeting of the Chemical Trade Joint Industrial Council Mr. Roscoe Brunner is reported to have made a statement on behalf of the employers to the effect that the advances already given in the trade adequately compensated for the increased cost of living, and that the time is now inopportune to consider any question of a further increase. The men, it is said, now ask that their claim should be submitted to an *ad hoc* court consisting of persons nominated from the Minister of Labour's panel by both sides respectively, the Chairman to be appointed by the Minister of Labour.

Oil Stoppage

DRASTIC action has been taken by the Imperial Oil Co., a Canadian subsidiary of the Standard Oil Co. of New Jersey. The Company has notified its consumers that from the end of December to the beginning of June all supplies of fuel oil will be cut off, owing to inability to obtain fresh supplies. It is expected that Mexican wells will be ready to supply the Pacific coast demand by June; in the meantime the outlook to a large number of purchasers for industrial and heating plants is somewhat black. The gasoline supply is not affected.

Superphosphates in Uruguay

ATTENTION is being given by the Administrative Councy of Uruguay to a project for the establishment of a factory for the manufacture of superphosphates for use as fertilizers. Bones are being exported at a low price at the present time and there is said to be a great abundance, and a cheap supply of acid is guaranteed. The project would prohibit the exportation of bones. This point is strongly objected to by the Council, who are in favour of placing a high export duty on bones rather than prohibiting their exportation.

From Week to Week

American scientists are to explore 1,000 miles of the Amazon basin next year in search of new drugs and narcotics.

CHROMIUM COMPOUNDS are to be made at Viljvensdrift, Orange Free State.

RECENT figures give the Belgian output of soap at four million lbs. a year.

It is reported from Santiago that the Chilian Government has received propositions for the acquisition of the nitrate oficinas at Port Tocopilla, in the Antofagasta region.

British Mexican Petroleum Company have an order from Harland & Wolff for two steel oil barges, designed to carry 800 tons of oil. The barges were finished last week.

An honorary degree was conferred upon Mr. T. M. Lowry, C.B.E., professor of Physical Chemistry, at Cambridge University, on October 29.

Export of superphosphates to Poland has been prohibited in Germany as a form of reprisal for the seizing of German ships.

Professor J. Norman Collie will lecture on "Rare Gases in Atmosphere," on November 19, at 6 p.m., at University College. The lecture is one of the L.C.C. series for teachers.

Messrs. Parke, Davis & Co., manufacturing chemists, Hounslow, have appointed Dr. O. Kamm, of Illinois University, director of their chemical research department.

At an inaugural meeting at Exeter University College the success that has attended the establishment of the school of Pharmacy was emphasised.

Mr. HERBERT MARSDEN, of Kuala Lumpur, assistant Government Chemist in the Federated Malay States, and Miss GWERFYL WILLIAMS, of Cymryd, Conway, were married at Bangor on October 23.

A French group is reported to be negotiating for the purchase of large blocks of shares of the Magnesite and Mining Co., in Styria. The group, to which several large French ironworks belong, is anxious to secure the supplies of magnesite.

RADIUM SUBSTITUTE can be produced by purifying mesothorium, according to Mr. G. F. Breckenridge and Dr. Harman Schlundt, of the Missouri University Chemistry Laboratory. Mesothorium is a by-product in the manufacture of gas mantles and is obtained from monazite.

"Modern Developments of the Atomic Theory" was the subject of a lecture by Dr. John A. Cranston to the Glasgow section of the Society of Chemical Industry. The lecturer traced the influence of the discoveries of radio activity, X rays, and the electron on our knowledge of the constitution of the atom.

In our last week's issue the death was notified of Mr. L. P. Wilson, chairman of the Birmingham and Midland section of the Society of Chemical Industry, and mentioned that Dr. Browasdon succeeds to the chair. We are now able to state that Professor G. T. Morgan has been elected vice-chairman in the stead of Dr. Browasdon.

Over 70 members of the Yorkshire junior branch of the Society of Dyers and Colourists, on Thursday, October 28, visited the chemical works of Messrs. L. B. Holliday & Co., Huddersfield. Major Holliday, Mr. Fearnsides, and Dr. Clayton acted as guides. Special interest was taken in the testing and research laboratories. Messsrs. Holliday entertained the visitors to tea.

A smoking concert was held on Thursday, October 28, at the Midland Hotel, Bradford, under the auspices of the West Riding section of the Society of Dyers and Colourists, Mr. H. Jennings presiding. It was announced that arrangements were being made for the use of a room at the Midland Hotel as a club for members of the society, and an attempt was to be made to provide a trade library there.

Among the key industries now being considered by Parliament is the laboratory and scientific glassware industry. Naturally the comparison with German goods calls for attention. According to the President of the Society of Glass Technology the finish of the majority of the best British makes of resistant glass is now as good as, if not better than, that of German glass of comparable composition.

A general meeting of the Members of the Royal Institution was held on Monday afternoon, Sir James Crichton-Browne, treasurer and vice-president, in the chair. The secretary reported the deaths of Professor Armand Gautier, an honorary member, and of Professor John Perry, and resolutions of condolence with the relatives were passed. Commander R. B. Brooks and Mr. J. F. Dalton were elected members.

The general purposes committee of the Birmingham Chamber of Commerce, in a report on the future policy to be followed in the organisation of British Trade Fairs, favours the inclusion of factors and merchants among the classes eligible as exhibitors. "If the fair" the report states, "is to be thoroughly representative of all classes of British commodities, it will be necessary to include merchants and factors so long as the exhibits are confined to British goods."

Agents of the German potash syndicate are reported to be spreading statements that the French-owned Alsatian potash industry is suffering from lack of machinery, spare parts, and special apparatus needed in the mines. The reports are probably exaggerated, but they raise the question whether British engineering firms specializing in mine machinery and chemical apparatus might not develop their business in connection with the Alsatian potash industry.

At the Agricultural and Horticultural Research Station, Long Ashton, Bristol, an investigation is being pursued into the problem of the toxic action of sulphur used as a fungicide. It is suggested that the toxicity may be due to the gradual oxidation of the sulphur to sulphur dioxide, to the formation of sulphuretted hydrogen, to conversion into sulphuric acid, or the sulphur may act of itself by its own vapour. But so far the experiments show that under ordinary practical conditions none of these hypotheses meets the case.

An address will be delivered to members of the London Chamber of Commerce by Sir Walter Townley, K.C.M.G., (ex-British Minister at the Hague and Governor of the British Chamber of Commerce for the Netherlands East Indies) on Tuesday, November 2, at 2.30 p.m., on "The Opportunities for British Trade in the Dutch East Indies." Mr. Stanley Machin, J.P., President of the London Chamber, will preside, and Mr. William N. Dunn (late H.B.M. Consul General at Batavia) has intimated his intention of being present.

At a meeting of the Leeds Chamber of Commerce, last week, Mr. J. W. Pawson, of Messrs. John Nicholson & Sons, Ltd., Hunslet Chemical Works, asked the guidance of the Chamber in respect of a situation that had arisen in consequence of a strike of carters in the city. Carters in their employ had, he said, been intimidated, and although they had received permits from Mr. Maun, general secretary of the Amalgamated Association of Carters and Motormen, they would not run the risk of being molested, as their loads included jars of vitriol, and great danger might result from interference. The carters had no quarrel with the firm in regard to wages. It was decided to approach the Chief Constable on the matter.

In a recent issue of the official organ of the Aberdeen Chamber of Commerce a writer—dealing with the chemical industry in that district—mentions that this consists mainly of the production of coal tar products and sulphate of ammonia from the residual products of gas works and the manufacture of sulphuric acid. During the war the local works producing these products were carried on at a very high pressure, and they are still making a good output. The present values of coal tar products and of sulphate of ammonia are very high and have an important bearing in keeping down the price of coal gas, which the Aberdeen Council have decided to continue at the same price as last year, namely, 3s. 7d. per 1,000 cubic feet for ordinary purposes and 3s. 3d. per 1,000 cubic feet for motive power, less discounts up to 10 per cent. according to quantities.

Rubber Blaze

ON Sunday night a four-storey rubber warehouse at Lower Olives Wharf, Wapping, caught fire. The result was terrible. Three firemen were killed and several others badly hurt by an explosion. At one time the premises of the Commercial Gas Co. were in danger, but escaped with nothing worse than a deluge of water and serious inconvenience to the occupants by fumes. A woman and girl who were found dead in a house near by were, it is believed, killed by fumes. The damage is estimated at over £120,000. So far the origin of the fire is unknown.

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Abstracts of Complete Specifications

151,657. Colours Soluble in Fats and Oils, and Process of Preparing the Same. W. Clark, London. (From Chemische Fabriken Worms Akt.-Ges, 3, Taunus Anlage, Frankfort-on-Main, Germany). Application date, May 8, 1918.

Colours soluble in fats and oils are prepared by treating basic dyestuffs with naphthenic acids or montanic acid, or by treating alizarin dyestuffs with alkali salts of naphthenic acids, or montanic acid, and aluminium sulphate. Greater colour contrasts are shown by these colours when printed. In one example methyl violet base is mixed with the distillate of crude naphthenic acid boiling at 150°—200°C. at a pressure of 10 to 20 mm., and the mixture is stirred at 80°—100°C. till a clear coloured solution is obtained. In another example alizarin paste is treated with caustic soda lye, naphthenic acid is added, and the mixture is run into a hot solution of aluminium sulphate to separate the colouring matter. Other examples of colours are given.

151,684. Tricalcic Phosphates, Mechanical Treatment of. W. P. Thompson, Liverpool. (From La Compagnie des Phosphates de Constantine, 86, rue Saint Lazare, Paris.) Application date, June 14, 1919.

Phosphatic material which is composed of nodules of rich material mixed with poorer nodules and calcium carbonate powder is ground until a mixture of rich granules, and a fine powder of poorer phosphate mixed with calcium carbonate is obtained. The mixture is mechanically separated by a current of air followed by settling, giving a rich granular fraction, and a poor fraction which is so finely divided that it is soluble in citric acid, and thus suitable for use as a fertilizer.

151,698. Argentiferous Sulphide Ores, Treatment of. F. E. Elmore, Three Fields, Boxmoor, Herts. Application dates, June 23, and December 18, 1919.

Argentiferous lead-zinc sulphide ores are treated for the recovery of the silver by heating the ore or the argentiferous zinc sulphide residue obtained from it by the acid brine process, to a dull red heat in neutral or reducing gas. The material is then in such a condition that the silver and lead may be dissolved by a hot strong solution of sodium, calcium or magnesium chloride with a small proportion of hydrochloric acid or cupric chloride, leaving the zinc sulphide undissolved. A modification is described in which the ore is first heated with sodium chloride in air at 400°C., and then treated with solvents.

151,854. Thorium, Manufacture of. H. Wade, London. (From Lindsay Light Co., 161, Grand Avenue, Chicago, Ill., U.S.A.). Application date, November 19, 1919.

Thorium mineral such as monazite sand is treated with fuming sulphuric acid instead of ordinary sulphuric acid, the temperature being gradually raised to 200°—230°C. in three to four hours and finally 300°—330°C. The mixture is then treated with water, and the suspended insoluble thorium compound is decanted from the heavier siliceous material.

151,868. Diphenylamine Derivatives, Manufacture of. British Dyestuffs Corporation Ltd., and Turner, J. King's House, Kingsway, London, W.C.2, and L. G. Badier, 112, Bradford Road, Huddersfield. Application date, December 17, 1919.

An aqueous solution of the ammonium or sodium salt of hexa-nitro-diphenylamine (Aurantia yellow) is treated with potassium or cyanide solution when a brown derivative is formed which can be precipitated by salt. The brown dyestuff is fast to light. Other diphenylamine derivatives such as tetranitro—thio-oxy-diphenylamine, 2:4-dinitro-diphenylamine-parasulphonic acid or the corresponding metasulphonic acid may be similarly treated.

151,707. Anthranol, Manufacture of. A. G. Perkin, Grosvenor Lodge, Grosvenor Road, Leeds. Application date, June 26, 1919.

Anthraquinone is reduced by heating with glucose, cane sugar, molasses, maltose, lactose or the like, and caustic soda or potash, to produce anthranol.

International Specifications Not yet Accepted

148,738. Synthetic Tanning Agents. M. Melamid, 56, Loretto-strasse, Freiburg, Germany. International Convention date, July 21, 1919. Addition to 137,323. (*See* The Chemical Age, Vol. II., page 287.)

Tanning agents are produced by sulphonating, by means of sulphuric acid monohydrate, the alkali-soluble portions of anthracene oil or soft pitch.

148,743. Esters. Soc. Chimique des Usines du Rhone, anciennement Gillard, P. Monnet, et Cartier, 89, Rue de Miromesnil, Paris. International Convention date, July 30, 1919.

To obtain *p*-aminobenzoic butyl ester, *p*-aminobenzoic acid or *p*-nitrobenzoic acid is esterified with normal butyl alcohol and the product reduced.

148,750. Synthetic Tanning Agents Gerb-und Farbstoffwerke H. Renner & Co., Akt.-Ges., 20, Canal Strasse, Hamburg. (Assignees of H. Renner and W. Moeller, 20, Canal Strasse, Hamburg.) International Convention date, July 31, 1919.

Coumarone resin is mixed with a mono or poly-hydric phenol and with or without formaldehyde, and the mixture is sulphonated, or a sulphonated resin is condensed with a mono or poly-hydric phenol, with or without formaldehyde. Other condensing agents such as phenol-formaldehyde resins, aromatic hydrocarbons or their sulphonic acids, and acid resins are also described. If the coumarone resin contains indene, sulphuric acid may be the condensing and sulphonating agent. The products may be oxidised by ozone, hydrogen peroxide, potassium, bichromate or permanganate, or persulphates, to produce quinone-like compounds. Details of the processes are given.

148,763. Sulphonic Acids. Sudfeldt & Co., Melbe, Hanover, Germany. International Convention date, March 14, 1919.

Lignite tar oil is freed from polymerisable substances by treating with a small proportion of cold strong sulphuric acid, and is then sulphonated by further treatment with the acid at a higher temperature. The oil layer is treated with hot dilute soda lye and the sulphonates precipitated by the addition of sodium chloride. Water is added to the acid layer to remove excess of acid, and the acid resins are then dissolved in a large excess of water and the impurities precipitated by adding a small quantity of sodium chloride. The sodium sulphonates are then obtained by adding a further quantity of sodium chloride.

148,779; 148,780-1-2-3-4. Producer Gas and Ammonium Chloride. A. Riedel, Kossern, Grimma, Saxony. International Convention dates, November 8, 1915, November 20, 1915, January 3, 1916, February 29, 1916, February 29, 1916, and July 16, 1917, respectively.

148,779. Coal, peat, or bituminous shale is burnt in a by-product producer gas plant, and the combined nitrogen converted into ammonium chloride which is recovered by washing the gas with water.

148,780. Steam or water is introduced into the producer at the zone where the temperature is 500-800°C. to obtain nitrogen compounds from the coal. If hydrated magnesium or calcium chloride is added to supply the necessary water, the formation of ammonium chloride is facilitated.

148,781. When alkali chlorides or alkaline earth chlorides are added as above, or their aqueous solutions are used for quenching the coke, the latter is particularly suitable for blast furnaces.

148,782. Salts are added to the coal in a producer as mentioned in 148,780, additional salts such as ammonium sulphate, urea, or a mixture of lime and ammonium chloride

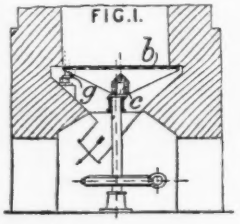
lye being also specified. The acid gases are neutralised by ammonia. The sulphur form the fuel remains largely in the ash.

148,783. Water or steam and a chloride are added to the fuel in a producer and ammonium chloride is extracted from the gas by washing.

148,784. In the above processes, the ammonium chloride is recovered by washing the gases with coal-tar oil at 100°-450°C.

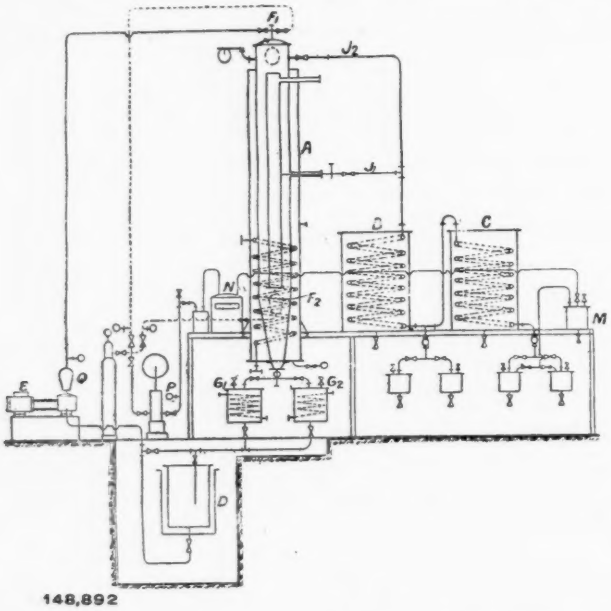
148,785. TAR. C. Falk (representative of H. Falk), Germany. International Convention date, December 10, 1917.
Brown coal is mixed with alkali or alkaline earth chlorides and distilled; the percentage of paraffin in the tar obtained is thereby increased.

148,825. LIME KILNS AND THE LIKE. W. Fuchs, 5, Hutterteich, Brunn, Mahren, Germany. International Convention date, February 14, 1919.
The grate *b* of a kiln for burning lime, magnesite, cement, &c., is given a combined reciprocating and circular movement by cranks or eccentrics *c*, *g*. The crank *c* is positively driven and the crank *g* constitutes a guide. The burned product is this automatically discharged.



148,825

148,892. FATTY ACIDS, MANUFACTURE OF. Deutcshe Erdol Akt.-Ges., 112, Kurfurstenstrasse, Berlin. International Convention date, July 12, 1919.
Hydrocarbons such as petroleum, petroleum distillates, or tars from the distillation of wood, peat, shale, lignite or coal, are drawn from the reservoir D by the pump E and sprayed by a nozzle F into the top of a chamber A, which is heated and contains a catalyst supported on inert material. Air enriched with oxygen is supplied from the gasholder N to the pump P,


148,892

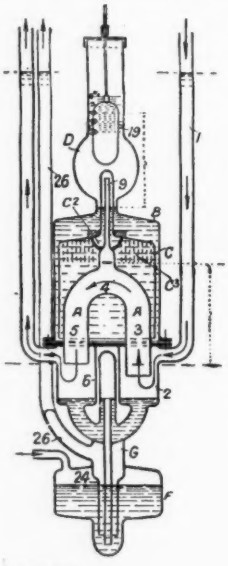
which forces it into the chamber A to oxidise the fine spray of hydrocarbon. The partly oxidised liquid passes into the receivers G_1, G_2, and then back to the reservoir D for further treatment. Volatile oxidation products pass out with the gases through the pipes J_1, J_2, and are recovered in the condensers B, C and scrubber M, while the gases are returned to the holder N and enriched with oxygen from the cylinder Q. The products are sampled until oxidation is sufficient, which may be in 10-12 hours.

148,897-8. SYNTHETIC TANNING AGENTS. Chemische Fabriken Worms Akt.-Ges., 3, Taunus-Anlage, Frankfurt-on-Main, Germany. International Convention dates, August 17 and August 24, 1916. Additions to 148,126. (*See* THE CHEMICAL AGE, Vol. III., page 455.)

148,897. Vegetable tanning agents are coupled with aromatic compounds containing acid groups, or with water-soluble aliphatic compounds. Examples are given in which—(1) Phenol sulphonic acid is mixed with tannin and heated with formaldehyde; (2) barium cresol sulphonate or naphthalene sulphonic acid is mixed with tannin and heated with formaldehyde; (3) a mixture of naphthalene, phenol and sulphuric acid is heated, and condensed with formaldehyde, and the product further heated with tannin and formaldehyde; (4) a mixture of coal-tar phenols boiling at 185°C. to 200°C. is heated with sodium sulphide and formaldehyde, and quebracho extract and formaldehyde added with further heating; (5) glucose is mixed with tannin and heated with formaldehyde.

148,898. Aromatic hydroxy compounds or their metal salts are coupled with aliphatic hydroxy compounds, or alternatively the aromatic compounds may be free from hydroxy groups. In another modification aromatic compounds may be coupled repeatedly by means of aldehydes, phosphorus pentoxide, &c., to obtain compounds of high molecular weight which are solubilised by introducing acid groups. Examples are given involving the use of phenol, cresol, or naphthol sulphonic acids, glucose, and formaldehyde, as well as numerous derivatives and alternatives.

148,923. TETRAHYDRONAPHTHALENE DERIVATIVES. Tetralin Ges., 5, Behrenstrasse, Berlin. International Convention date, March 17, 1916.
Tetrahydronaphthalene or its homologues substituted either in the aromatic or cyclohexane ring by methyl, ethyl, &c., groups, or the hydroxy derivatives substituted in either ring are treated with nitrating mixtures such as nitric acid and sulphuric or acetic acid containing less than 25 per cent. of water, the temperature being below 50°C., to produce nitro derivatives. The nitro derivatives may be reduced by known methods to hydroxylamine, hydrazo, azo, or azoxy compounds, or to amino derivatives. Many examples are given.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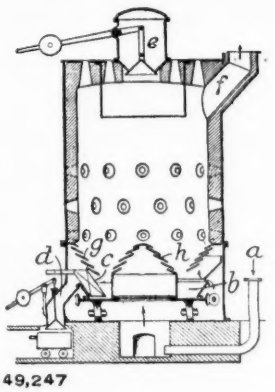
148,998. GAS ANALYSIS. M. Arndt, 2B, Casinostrasse, Aachen, Germany. International Convention date, November 30, 1915.
A sample of the gas passing through the passages 1, 4 is trapped in the measuring chamber *A* by a liquid rising from the reservoir *F* under gas pressure. The gas passes through the pipe 9 into the weighted bell *C*, where absorption takes place, and the unabsorbed gas remains. A corresponding volume of liquid is forced from the vessel *B* containing the absorbing medium into the recording device *D* in which a guided float 19 indicates the proportion of gas absorbed. When the gas sample is wholly discharged from the chamber *A* the bottom of the pipe 24 is unsealed by the liquid in *F* and the actuating gas then escapes through the pipe 26. The liquid returns to the reservoir *F* when the gas pressure is released.

149,001. ALUMINIUM SULPHATE. G. Muth, 20, Wetzendorferstrasse, Nurnberg, Germany, and L. Duvinage, 8, Rue Ste. Gudule, Brussels. International Convention date, May 13, 1919.
Clay or bauxite is treated with sulphuric acid or bisulphates in the presence of hydrofluoric acid, fluorspar, or silicon fluoride, to obtain aluminium sulphate.

149,247. TREATING ORES. J. Simon, Frankfort-on-Main, Germany. International Convention dated August 2, 1917.

A mixture of burnt pyrites, salt, and 2 per cent. of coke breeze is charged through a hopper *e* into a shaft furnace and air passes upwards through stationary and inclined revolving step grates *g* and *h*. The roasted and chloridised material is transferred to a chute *d* from a rotary channel *b* by a fixed scraper *c*.



149,247

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152,975. Processes for the production of hydrogen and ofmixtures of hydrogen and nitrogen. Toniolo, C., & Officine Elettrochimiche Dottor Rossi. October 21, 1919.

152,990. Process for increasing the yield of chromium in the aluminothermic production of carbon-free ferro-chromium or multiple alloys thereof from chrome-iron ore. Goldschmidt Akt. Ges., T. October 14, 1919.

152,667. Rotary roasting and calcining furnaces. Rheinische Nassauische Bergwerks-Und Hutten Akt.-Ges. October 20, 1919.

152,668. Process and apparatus for the combustion of bituminous fuel with recovery of the by-products. Strache, H. August 6, 1919.

152,687. Method and apparatus for cooling liquids and charging the same with gas by the use of snow-like carbonised anhydride. Soc. Des Gaz Radioactifs Naturels De Colombieres Sur Orb. October 22, 1919.

152,997. Treatment of finely-divided zinc. Electrolytic Zinc Co. October 24, 1919.

153,006. Manufacture of an artificial manure. Ges. Fur Landwirtschaftlichen Bedarf Ges. February 24, 1919.

Aitchison, L., and Dyson, W. H. Purification of metallic ores or residues containing metallic oxides. 30,507. October 28.

,, Purification of tungsten ores and residues containing oxide of tungsten. 30,508. October 28.

Black, J. S. Retorts for distillation of oil-bearing shales, &c. 30,724. October 30.

Boynton, V. K. Process of producing interactions between gas and a liquid. 30,354. October 27. (United States, November 20, 1919.)

Camus, E., Criquebœuf, G., and Duchemin, R. Manufacture of acetic acid and its homologues. 30,311. October 26.

Chaillaux, P. Manufacture of gold-coloured sulphurs and vermilions of antimony. 30,268. October 26.

Dacey, W. D. Means for rubberizing hides or skins. 30,159. October 25.

Dootson, F. W. Production of light oils, lubricating oils, and gas by cracking pitch and heavy oils. 30,127. October 25.

Maclaren, A. F. Utilization of wet powdered fuel. 30,749. October 30.

Mather, J. C. Means of applying blues and dyes. 30,337. October 27.

Nitrum Akt.-Ges. Process for changing lime-nitrogen into urea. 30,116. October 25. (Switzerland, November 7, 1919.)

Sauer, J. N. A. Neutral and sterile decolorizing carbon. 30,285. October 26.

Specifications Accepted, with Date of Application

130,978. Dehydrating, reducing, calcining or roasting minerals and other pulverulent material, Apparatus for. J. Reol. August 9, 1918.

136,169. Neutralising mineral oils which have been treated with acid, process for. G. Grisard. December 4, 1918.

138,330. Glycerol from sugar, Manufacture of. Vereinigte Chemische Werke Akt.-Ges. May 19, 1916. Addition to 138,099.

152,366. Alkali percarbonates, Manufacture of. H. Wade. (*Deutsche Gold- & Silber-Scheidean Stalt vorm. Roessler.*) August 20, 1917.

152,384. Phenol formaldehyde condensation products. A. W. Weller and W. T. Robinson-Bindley. June 10, 1919.

152,387. Soluble nitrogen compounds, Recovery from solutions. E. H. Richards and H. B. Hutchinson. June 14, 1919.

152,401. Anhydrous magnesium chloride or double chloride, Process and apparatus for the production of. E. A. Ashcroft. July 9, 1919.

152,402. Electrolytic decomposition of anhydrous magnesium chloride, and the production of magnesium and chlorine. E. A. Ashcroft. July 9, 1919.

152,403. Magnesium or alloys of magnesium and a by-product therefrom, Production of. E. A. Ashcroft. July 9, 1919.

152,420. Destructive distillation of wood in suction gas plant, Process for the extraction and recovery of by-products formed by. J. C. Roberts. July 14, 1919.

152,437. 4-Nitro-beta-Naphthol, Manufacture of. G. T. Morgan and British Dyestuffs Corporation. July 17, 1919.

152,447. Separation of sulphur from gases obtained in the roasting and smelting of sulphur-bearing ores. C. G. Collins. July 22, 1919.

152,470. Benzole or the like, Purification of. South Metropolitan Gas Co., E. V. Evans, and H. Hollings. August 16, 1919.

152,495. Alcohol or ether, Manufacture of. A. A. L. J. Damiens, M. C. J. E. de Loisy, and O. J. G. Piette. September 16, 1919.

152,526. Arsenious acid, Process of refining. M. Uchino. October 27, 1919.

152,554. Hydrogen, Production of. C. Toniolo and Officine Elettrochimiche Dottor Rossi. October 29, 1919.

Voluntary Liquidation

A MEETING of the creditors of Clem P. Clayton Co., Ltd., horticultural and agricultural chemists, Enfield, Middlesex, was held on November 1. Mr. A. G. Westacott, the liquidator, occupied the chair. The statement of affairs presented showed liabilities of £1,122. 16s. 8d., all of which were due to unsecured creditors. The assets were estimated to realise £828. 8s. 9d., from which had to be deducted £28. 10s. for preferential claims, leaving net assets of £799. 18s. 9d., or a deficiency of £322. 17s. 11d. The assets consisted of stock-in-trade at cost £610. 18s. 6d., office furniture, fittings, &c., £78. 13s. 6d., book debts expected to produce £69. 5s. 4d., motor vehicle £65, and balance at bank £4. 11s. 5d. The chairman stated that the company was incorporated on January 9 of the present year, with a nominal capital of £2,000, divided into 2,000 ordinary shares of £1 each. The company had issued 900 shares as fully paid. Of that number 575 were issued for cash. The liquidation had taken place because the company did not possess sufficient capital to carry on the business. Mr. W. Scott and Mr. Clayton were the two directors of the company and had never drawn any directors' fees, while they had only received nominal amounts for their services to the company. The deficiency was accounted for by the loss on the trade. There was nothing in the conduct of the company which called for comment. He had been endeavouring to get an offer to submit to the creditors, and negotiations to that end were still in progress. It was possible that an offer would be made within the next seven days. He suggested that an informal committee of the principal creditors should be elected to consider any offer that was submitted. A creditor asked if any accounts had been prepared by the company, and Mr. Westacott replied that a balance-sheet was prepared covering the period from the inception of the company to August 31 last. That balance-sheet showed that the total turnover in the eight months was only £1,345, while there was a loss on the trading of over £600. In reply to another question as to what would happen if an order was not forthcoming, the chairman said that in that event he would realise the assets under the direction of the principal creditors. The creditors unanimously decided to confirm the voluntary liquidation of the company, with Mr. Westacott of A. G. Westacott & Co., 155, Fenchurch Street, E.C., as liquidator, and an informal committee of the three largest creditors was also appointed.

Dye Tariff in Canada

IT is reported from Montreal that the necessity of a tariff against German dyes has been laid before Sir Harry Drayton, Minister of Finance, on behalf of British dyestuff manufacturers, five of whom are represented in Canada. It is believed that the textile mills in Canada are the largest users, but that coming developments will bring the pulp and paper mills to the front, as already quantities in excess of a million dollars are consumed annually. Already some firms are under-bidding the British dyers for Canadian business. The matter is being taken up by the Tasiff Commission.

Monthly Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co. and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The weekly report contains only commodities whose values are at the time of particular interest or of a fluctuating nature. A more complete report and list are published once a month. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.*

British Market Report

THURSDAY, NOV. 4.

A rather better tone has been evident during the past week, due, no doubt, to anticipation of the settlement of pressing industrial problems. In one or two directions an improvement in values is indicated and in other the downward tendency has been arrested. The export business remains unsatisfactory, and it is difficult to see where substantial improvement can set in whilst exchanges are so demoralised.

General Chemicals

ACETONE remains firm in price and in normal enquiry.

ACID ACETIC is only in moderate demand, as many users are working off their stocks. No arrivals of importance are reported.

ACID CARBOLIC remains a slow and easy market.

ACID FORMIC is firmer in price and the quantities offered are relatively small.

ACID OXALIC is in poor demand and the price easy.

ACID TARTARIC.—The improvement which we indicated last week has been maintained.

BLEACHING POWDER.—A limited quantity is available for export but is firmly held.

COPPER SULPHATE is still an easy market due to the absence of export orders.

FORMALDEHYDE.—It is considered in some quarters that the price has now touched bottom, and that an improvement in demand and a better standard of value may be established.

LEAD SALTS are quietly steady.

POTASSIUM PRUSSIATE is still short for prompt delivery. The price is a turn higher.

SODA CAUSTIC appears to have found its level for the time being, but only a limited business is visible.

SODA PHOSPHATE is decidedly easy, with a limited turnover.

SODA PRUSSIATE.—There is a considerable enquiry for export, and with manufacturers well booked ahead, the article seems to be in a healthy position.

ZINC OXIDE.—The prices are lower on the week and a moderate business is reported.

ZINC SALTS are unchanged.

BICHROMATES.—As we reported last week, the English manufacturers have fixed their prices for next year, and we understand the figures are as follows:—

SODA BICHROMATE, 10½d. per lb.

POTASH BICHROMATE, 1s. 3d. per lb.

Both less 5 per cent. discount, carriage paid to consumers' works.

Coal Tar Intermediates

There are signs of a slight revival in the interest displayed in this market, but relatively only a small amount of new business has been transacted. The fluctuations in exchanges of course militate against much export business.

ALPHA NAPHTHOL is nominally without change in price with makers fairly well occupied.

BETA NAPHTHOL seems to have found its level for the time being, and a little more interest is now being taken in the product.

DI NITRO PHENOL is in moderate request without change in price.

DI METHYL ANILINE is steadier and some fair business has been transacted.

NITRO BENZOLE is only moving off slowly and price is unchanged.

ORTHO NITRO PHENOL is in moderate demand at last figures.

PARANITRANILINE is very steady and a fair amount of business is passing.

SALICYLIC ACID is as idle as ever, but there is no change in the last quotation.

Coal Tar Products

The market for Coal Tar Products is very quiet, the Coal Strike having a deadening effect on business.

90's BENZOL remains unchanged at 3s. 9d. to 3s. 10d. in the North, and 3s. 11d. to 4s. in the South.

PURE BENZOL is quiet with sellers at about 4s. to 4s. 1½d.

CREOSOTE OIL remains firm at 1s. 1d. to 1s. 1½d. in the North, and 1s. 2d. to 1s. 3d. in the South.

CRESYLIC ACID.—There is rather more demand, and prices are steady at 3s. 10d. to 4s. for Dark 95/97 per cent., and at 4s. 6d. to 4s. 9d. for Pale 97/99 per cent.

SOLVENT NAPHTHA still quiet and nominally at 3s. on rail at works.

HEAVY NAPHTHA.—Very little is being done and prices remain steady at 3s. 3d. to 3s. 5d., according to position.

NAPHTHALENE is somewhat quieter, prices ranging from £14 to £26 per ton for Crude, while Refined is very slow at about £45 to £50 per ton.

PITCH.—The market is quiet and very few transactions have been reported during the last few days.

Sulphate of Ammonia

There are no new features to report.

French Market Report

This market continues idle and quotations in general continue to decline under pressure from second hands.

ACID ACETIC 80 PER CENT. is without feature and stands at about 570 francs per 100 kilos.

ACID CITRIC is declining daily, and the price may be taken at 22 francs per kilo.

ACID LACTIC is quoted at 330 francs per 100 kilos.

ACID OXALIC is 1,200 francs per 100 kilos.

COPPER SULPHATE is only in quiet demand at 210 francs.

BARIUM CHLORIDE is featureless, and is a weak market at 140 francs.

CALCIUM CHLORIDE has been in demand at about 70 francs per 100 kilos.

MAGNESIUM CHLORIDE is in fair request at 65 francs.

POTASSIUM PERMANGANATE is 25 francs per kilo.

POTASSIUM PRUSSIATE is 1,200 francs per 100 kilos.

SODIUM CAUSTIC is 150 francs.

SODIUM PRUSSIATE is 800 francs per 100 kilos.

SODIUM BICHROMATE is about 630 francs per 100 kilos, with a fair business passing.

German Market Report

Since the date of our last report trade has only been moderate in this market. Works are now gradually coming into full operation and for many products the supply is in excess of the demand.

ALUMINA SULPHATE has been in fair request at 240 marks per 100 kilos.

AMMONIUM CARBONATE is slow at 7 marks per kilo.

ACID ACETIC is idle, and the price may be taken at about 9 marks for 80 per cent. material.

ACID OXALIC is selling at 12 marks per kilo.

POTASSIUM PERMANGANATE is only in small request at about 60 marks per kilo.

POTASSIUM PRUSSIATE is in moderate demand at about 280 marks per 100 kilos.

SODIUM CAUSTIC has been idle with practically no business passing.

SODIUM SULPHIDE has been fairly active at about 9 marks per kilo.

Current Prices

Chemicals

	per	£	s.	d.		£	s.	d.
Acetic anhydride	lb.	0	3	9	to	0	4	0
Acetone oil	ton	90	0	0	to	95	0	0
Acetone, pure	ton	120	0	0	to	125	0	0
Acid, Acetic, glacial, 99-100%	ton	100	0	0	to	105	0	0
Acetic, 80% pure	ton	72	10	0	to	75	0	0
Arsenic	ton	100	0	0	to	105	0	0
Boric, cryst.	ton	74	10	0	to	76	0	0
Carbolic, cryst. 39-40%	lb.	0	0	10½	to	0	0	11
Citric	lb.	0	3	6	to	0	3	9
Formic, 80%	ton	115	0	0	to	120	0	0
Gallic, pure	lb.		7	3	to	0	7	6
Hydrofluoric	lb.	0	0	8½	to	0	0	9
Lactic, 50 vol.	ton	58	0	0	to	60	0	0
Lactic, 60 vol.	ton	67	10	0	to	70	0	0
Nitric, 80 Tw.	ton	41	0	0	to	44	0	0
Oxalic	lb.	0	1	10	to	0	1	11
Phosphoric, 1.5	ton	65	0	0	to	67	0	0
Pyrogallic, cryst	lb.	0	11	6	to	0	11	9
Salicylic, Technical	lb.	0	2	0	to	0	2	3
Salicylic, B.P.	lb.	0	2	11	to	0	3	0
Sulphuric, 92-93%	ton	8	10	0	to	8	15	0
Tannic, commercial	lb.	0	3	6	to	0	3	9
Tartaric	lb.	0	2	6	to	0	2	7
Alum, lump	ton	19	10	0	to	20	0	0
Alum, chrome	ton	75	0	0	to	77	10	0
Alumino ferric	ton	9	0	0	to	9	10	0
Aluminium, sulphate, 14-15%	ton	17	10	0	to	18	10	0
Aluminium, sulphate, 17-18%	ton	20	10	0	to	21	10	0
Ammonia, anhydrous	lb.	0	2	2	to	0	2	4
Ammonia, .880	ton	43	0	0	to	45	0	0
Ammonia, .920	ton	30	0	0	to	32	10	0
Ammonia, carbonate	lb.	0	0	7½	to		—	
Ammonia, chloride	ton	95	0	0	to	100	0	0
Ammonia, muriate (galvanisers)	ton	60	0	0	to	65	0	0
Ammonia, nitrate	ton	55	0	0	to	60	0	0
Ammonia, phosphate	ton	120	0	0	to	125	0	0
Ammonia, sulphocyanide	lb.	0	3	0	to	0	3	3
Amyl acetate	ton	420	0	0	to	425	0	0
Arsenic, white, powdered	ton	80	0	0	to	82	0	0
Barium, carbonate, 92-94%	ton	12	10	0	to	13	0	0
Barium, chlorate	lb.	0	0	11	to	0	1	0
Chloride	ton	27	0	0	to	28	0	0
Nitrate	ton	55	0	0	to	56	0	0
Barium Sulphate, blanc fixe, dry	ton	30	0	0	to	31	0	0
Sulphate, blanc fixe, pulp	ton	16	10	0	to	17	0	0
Sulphocyanide, 95%	lb.	0	1	6	to	0	1	8
Bleaching powder, 35-37%	ton	31	0	0	to	32	0	0
Borax crystals	ton	41	0	0	to	42	10	0
Calcium acetate, Brown	ton	20	0	0	to	21	0	0
,, Grey	ton	30	0	0	to	32	0	0
Calcium Carbide	ton	30	0	0	to	32	0	0
Chloride	ton	12	10	0	to	13	0	0
Carbon bisulphide	ton	65	0	0	to	67	0	0
Casein, technical	ton	75	0	0	to	80	0	0
Cerium oxalate	lb.	0	3	9	to	0	4	0
Chromium acetate	lb.	0	1	2	to	0	1	4
Cobalt acetate	lb.	0	13	0	to	0	14	0
Oxide, black	lb.	0	17	0	to	0	18	0
Copper chloride	lb.	0	1	3	to	0	1	6
Sulphate	ton	42	0	0	to	44	0	0
Cream Tartar, 98-100%	ton	225	0	0	to	230	0	0
Epsom salts (*see* Magnesium sulphate)								
Formaldehyde 40% vol.	ton	205	0	0	to	210	0	0
Formusol (Rongalite)	lb.	0	4	9	to	0	5	1
Glauber salts	ton	Nominal.						
Glycerine, crude	ton	70	0	0	to	72	10	0
Hydrogen peroxide, 12 vols.	gal.	0	2	9	to	0	2	10
Iron perchloride	ton	50	0	0	to	52	0	0
Iron sulphate (Copperas)	ton	4	0	0	to	4	5	0
Lead acetate, white	ton	72	10	0	to	75	0	0
Carbonate (White Lead)	ton	61	0	0	to	63	0	0
Nitrate	ton	65	0	0	to	67	0	0
Litharge	ton	57	0	0	to	59	0	0
Lithopone, 30%	ton	48	0	0	to	49	0	0
Magnesium chloride	ton	15	10	0	to	16	10	0
Carbonate, light	cwt	2	15	0	to	3	0	0
Sulphate (Epsom salts commercial)	ton	12	10	0	to	13	0	0
Sulphate (Druggists')	ton	18	10	0	to	19	10	0
Manganese, Borate	ton	190	0	0	to		—	
Sulphate	ton	130	0	0	to	135	0	0
Methyl acetone	ton	95	0	0	to	100	0	0
Alcohol, 1% acetone	gall.	Nominal.						
Nickel sulphate, single salt	ton	60	0	0	to	62	0	0
Nickel ammonium sulphate, double salt	ton	62	0	0	to	64	0	0
Potassium bichromate	lb.	0	1	6	to	0	1	7
Carbonate, 90%	ton	105	0	0	to	110	0	0
Chloride	ton	50	0	0	to	52	0	0
Chlorate	lb.	0	0	9½	to	0	0	10½
Meta bisulphite, 50-52%	ton	225	0	0	to	230	0	0
Nitrate, refined	ton	65	0	0	to	67	0	0
Permanganate	lb.	0	3	6	to	0	3	9
Prussiate, red	lb.	0	4	0	to	0	4	3
Prussiate, yellow	lb.	0	2	0	to	0	2	1
Sulphate, 90%	ton	31	0	0	to	33	0	0
Salammoniac, firsts	cwt.	5	10	0	to		—	
Seconds	cwt.	5	5	0	to		—	
Sodium acetate	ton	50	0	0	to	52	0	0
Arsenate, 45%	ton	60	0	0	to	62	0	0
Bicarbonate	ton	10	10	0	to	11	0	0
Bichromate	lb.	0	1	2	to	0	1	3
Bisulphite, 60-62%	ton	47	10	0	to	50	0	0
Chlorate	lb.	0	0	5½	to	0	0	5½
Caustic, 70%	ton	31	0	0	to	32	0	0
Caustic, 76%	ton	32	10	0	to	33	0	0
Hydrosulphite, powder, 85%	lb.	0	4	6	to	0	4	10
Hyposulphite, commercial	ton	35	10	0	to	37	10	0
Nitrite, 96-98%	ton	75	0	0	to	77	0	0
Phosphate, crystal	ton	41	0	0	to	42	0	0
Perborate	lb.	0	2	2	to	0	2	4
Prussiate	lb.	0	1	2½	to	0	1	3½
Sulphide, crystals	ton	25	0	0	to	27	10	0
Sulphide, solid, 60-62%	ton	45	0	0	to	47	0	0
Sulphite, cryst.	ton	17	10	0	to	18	10	0
Strontium carbonate	ton	85	0	0	to	90	0	0
Strontium Nitrate	ton	90	0	0	to	95	0	0
Sulphate, white	ton	8	10	0	to	10	0	0
Sulphur chloride	ton	42	0	0	to	44	10	0
Sulphur, Flowers	ton	19	0	0	to	19	10	0
Roll	ton	19	0	0	to	19	10	0
Tartar emetic	lb.	0	3	0	to	0	3	2
Tin perchloride, 33%	lb.	0	2	6	to	0	2	7
Perchloride, solid	lb.	0	3	0	to	0	3	3
Protochloride (tin crystals)	lb	0	2	0	to	0	2	1
Zinc chloride, 102 Tw.	ton	22	0	0	to	23	10	0
Chloride, solid, 96-98%	ton	60	0	0	to	65	0	0
Oxide, 99%	ton	56	0	0	to	57	0	0
Dust, 90%	ton	90	0	0	to	92	10	0
Sulphate	ton	21				23	10	0

Coal Tar Intermediates, &c.

Alphanaphthol, crude	lb.	0	4	0	to	0	4	3
Alphanaphthol, refined	lb.	0	5	0	to	0	5	3
Alphanaphthylamine	lb.	0	3	6	to	0	3	9
Aniline oil, drums extra	lb.	0	1	8	to	0	1	9
Aniline salts	lb.	0	1	10	to	0	2	0
Anthracene, 85-90%	lb.		—		to		—	
Benzaldehyde (free of chlorine)	lb.	0	5	9	to	0	6	0
Benzidine, base	lb.	0	13	6	to	0	14	0
Benzidine, sulphate	lb.	0	10	6	to	0	11	0
Benzoic acid	lb.	0	4	0	to	0	4	3
Benzoate of soda	lb.	0	4	3	to	0	4	6
Benzyl chloride, technical	lb.	0	2	0	to	0	2	3
Betanaphthol benzoate	lb.	0	14	0	to	0	14	6
Betanaphthol	lb.	0	4	0	to	0	4	3
Betanaphthylamine, technical	lb.	0	11	6	to	0	12	6
Croceine Acid, 100% basis	lb	0	5	0	to	0	6	3
Dichlorbenzol	lb.	0	0	6	to	0	0	7
Diethylaniline	lb.	0	7	9	to	0	8	6
Dinitrobenzol	lb.	0	1	4	to	0	1	5
Dinitrochlorbenzol	lb.	0	1	5	to	0	1	6
Dinitronaphthaline	lb.	0	1	6	to	0	1	8
Dinitrotoluol	lb.	0	1	8	to	0	1	9
Dinitrophenol	lb.	0	2	9	to	0	3	0
Dimethylaniline	lb.	0	5	9	to	0	6	0
Diphenylamine	lb.	0	5	0	to	0	5	3
H-Acid	lb.	0	14	6	to	0	15	0
Metaphenylenediamine	lb.	0	5	9	to	0	6	0
Monochlorbenzol	lb.	0	0	10	to	0	1	0
Metanilic Acid	lb.	0	7	6	to	0	8	6
Monosulphonic Acid (2:7)	lb.	0	7	6	to	0	8	0
Naphthionic acid, crude	lb.	0	5	0	to	0	5	6
Naphthionate of Soda	lb.	0	6	0	to	0	6	3
Naphthylamin-di-sulphonic-acid	lb.	0	5	6	to	0	6	6
Nitronaphthaline	lb.	0	1	6	to	0	1	8
Nitrotoluol	lb.	0	1	3	to	0	1	4
Orthoamidophenol, base	lb.	0	18	0	to	1	0	0
Orthodichlorbenzol	lb.	0	1	1	to	0	1	2
Orthotoluidine	lb.	0	2	6	to	0	2	9
Orthonitrotoluol	lb.	0	1	3	to	0	1	4
Para-amidophenol, base	lb.	0	12	6	to	0	13	0
Para-amidophenol, hydrochlor	lb	0	13	0	to	0	13	6

	per	£	s.	d.		£	s.	d.
Paradichlorbenzol	lb.	0	0	6	to	0	0	8
Paranitraniline	lb.	0	8	0	to	0	8	3
Paranitrophenol	lb.	0	2	9	to	0	3	0
Paranitrotoluol	lb.	0	5	9	to	0	6	0
Paraphenylenediamine, distilled	lb.	0	13	6	to	0	14	6
Paratoluidine	lb.	0	8	6	to	0	9	6
Phthalic anhydride	lb.	0	4	9	to	0	5	0
R. Salt, 100% basis	lb.	0	4	0	to	0	4	2
Resorcin, technical	lb.	0	11	6	to	0	12	6
Resorcin, pure	lb.	0	17	6	to	0	18	0
Salol	lb.	0	5	3	to	0	5	9
Shaeffer acid, 100% basis	lb.	0	3	6	to	0	3	0
Sulphanilic acid, crude	lb.	0	1	8	to	0	1	9
Tolidine, base	lb.	0	10	6	to	0	11	6
Tolidine, mixture	lb.	0	3	0	to	0	3	6

The following prices are furnished by Messrs. Miles, Mole & Co., Ltd., 101, Leadenhall Street, London, E.C.

Metals and Ferro Alloys

	per	£	s.	d.		£	s.	d.
Aluminium, 98-99%	ton	185	0	0	to	186	0	0
Antimony, English	ton	52	0	0	to	53	0	0
Copper, Best Selected	ton	97	0	0	to	99	0	0
Ferro-Chrome, 60%	ton	42	0	0	to	43	0	0
Manganese, loose	ton	37	0	0	to	38	0	0
Silicon, 45-50%	ton	23	0	0	to	24	0	0
Tungsten, 75-80%	lb.	0	3	3	to	0	3	6
Lead Ingot	ton	37	0	0	to	38	0	0
Lead Sheets	ton	49	0	0	to	50	0	0
Nickel, 98-99%	ton	230	0	0	to	231	0	0
Tin	ton	262	0	0	to	263	0	0
Spelter	ton	40	0	0	to	41	0	0

Structural Steel

Angles and Tees	ton	25	0	0	to	26	0	0
Rounds and Flats	ton	28	0	0	to	29	0	0
Joists	ton	24	0	0	to	25	0	0
Plates	ton	25	0	0	to	26	0	0
Rails, heavy	ton	25	0	0	to	26	0	0
Sheets, 24 Gauge	ton	38	0	0	to	40	0	0
Galvd. Corrd. Sheets	ton	39	0	0	to	40	0	0
Zinc Sheets	ton	67	0	0	to	70	0	0

Cardiff By-Products Market

Cardiff, Wednesday, November 3.

Sulphate of Ammonia—	
For home consumption (per ton o.t.)	£25 net d./d.
For export (per ton f.o.b.)	£30 to £40
Benzol, 90's (per gallon)	3/5 to 3/10
Benzol, 50's (per gallon)	3/5
Solvent Naphtha (per gallon)	3/- to 3/6
Heavy Naphtha (per gallon)	3/6
Crude Naphthalene Salts (per ton)	£16 to £26
Pitch (per ton)	200/- to 220/-
Creosote (per gallon)	1/2 to 1/4
Motor Benzol (per gallon)	3/5 to 3/10
Crude Benzol (per gallon)	1/9
Toluol Benzol (per gallon)	4/-

Alsatian Potash

THE enterprise (a correspondent writes) which the Alsatian mines have shown in undertaking the manufacture of sulphate of potash is a further indication that France will continue to hold the markets which she has secured. During the past year the output of French kainit 14 per cent., French potash 20 per cent. and 30 per cent., as well as muriate of potash 50 per cent. and 60 per cent., from the rich deposits in Alsace, has greatly increased. The consumption of potash by French agriculturists is now double of what it was in 1913. Industrial troubles have probably interfered with the importations of potash into England, nevertheless the British farmer is increasingly appreciating the value of the French supplies.

Recent Wills

Sir Joseph Norman Lockyer, of Earl's Court, Director of Solar Physics Conservatory, South Kensington	£60,508
Mr. J. W. Gatehouse, City Analyst for Bath	£2,056
Mr. F. C. Tipler, of Crewe, chief chemist of the London & North-Western Railway Co.	£1,204

Company News

BORAX CONSOLIDATED.—An interim dividend of 1s. per share, less tax, on the Deferred Ordinary shares has been declared in respect of the year ended September 30. It is notified that Coupon No. 25 of the Deferred Ordinary share warrants to bearer will be paid on November 18 at the offices of the company.

ROSARIO NITRATE.—On November 17 the Rosario Nitrate Co., Ltd., will hold an extraordinary general meeting for the purpose of considering resolutions that each of the existing £5 shares be divided into five fully-paid up registered £1 shares, and that certain alterations be made in the articles of association. The meeting will take place at noon at Winchester House, E.C.

SANTIAGO NITRATE.—Gross profit of £20,597 was shown on the accounts of the Santiago Nitrate Co. for the year ended June 30. Income tax and London expenses having been deducted, £14,460 remains. This amount has been added to the credit of the profit and loss account previously standing. A dividend of 7½ per cent., less tax, and the carrying forward of £5,973 is proposed.

ANGLO-PERSIAN OIL.—Sir Basil Zaharoff, at the head of a French group, figures in an agreement with a British group which was signed on Wednesday, October 27th. The British group consists of the Anglo-Persian Oil Company and those associated with it. The object is development, on a large scale, of oil supplies to France. Capital amounting to 100 million francs is involved, of which the Anglo-Persian Co. has agreed to subscribe 45 per cent. Other Companies included are being formed to work under the management of the Société Navale de l'Ouest, a fleet of tankers flying the French flag. A number of these tankers have already been laid down and are being constructed in British yards.

ANGLO-ECUADORIAN OILFIELDS.—Mr. W. H. Sillen presided at the first ordinary general meeting of the Ecuadorian Oilfields, Ltd., on October 29. He said no accounts would be submitted at that meeting. They were waiting for the accounts from Ecuador to arrive, when they would be amalgamated with the London balances and audited, and would be posted to shareholders with directors report and a notice convening the adjourned meeting. With regard to the testing of the company's properties the chairman said the well drilled by the vendors on the Anson property was flowing at the rate of five barrels per day, and the oil is of very much the same quality as is obtained at Peru. It was decided to drill a second well, and this was commenced in October, 1919, and is now at a depth of 2,120 ft.; the formation is reported to be hard sand, with traces of oil and gas. In order to test the northern portion of the property, it was decided to drill a well at Avanque. The material is on the spot and a camp erected.

SULPHATE OF AMMONIA ASSOCIATION.—On October 20, at the annual meeting of the Sulphate of Ammonia Association, a resolution was carried that the subscribers agree to wind up voluntarily. The winding up is to take effect immediately. Surplus assets available after settling debts and liabilities are to be paid to the British Sulphate of Ammonia Federation, Ltd., on the understanding that the Federation undertake to continue the propaganda work hitherto carried on by the Association, and to spend the money received on such propaganda. Mr. D. Milne Watson, the chairman, moved the adoption of the report. Nearly three-quarters of a million sterling surplus, he said, had been derived from exports under the Equalisation Scheme. During the summer of 1919 difficulty had been experienced to provide outlet for production. By spreading the orders among different makers it was possible to keep the works going during the critical period. The Association had avoided a disastrous fall in prices threatened by American competition, and had been able to keep connection in foreign markets, being in a position to act quickly and silently. At home 233,000 tons, or over 33,000 tons more than the requirement estimated by the Ministry of Agriculture, had been produced, although the high water mark in 1918 was 269,000 tons. During the year improvements in quality had been made in many of the largest works, and 30,000 tons of neutral quality was now produced annually. The formation of the Federation represents 90 per cent. of the British production, and the chairman said it was the most important event in the history of sulphate of ammonia in this country.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

Locality of Firm or Agent.	Materials.	Ref. No.
Australia ...	Glassware	556
Canada ...	Liquid and Powered soap ...	563
Belgium ...	Industrial supplies and specialities for metallurgical works, collieries and glass works	580
Argentine ...	Aluminium goods; glassware ...	597
Milan	Chemical and pharmaceutical products.	628
Trieste ...	Drugs; aniline dyes	629
Barcelona ...	Chemicals; drugs	—
Uruguay ...	Chemicals	639
Paris ...	Cotton oil; oil seeds	626
Brussels ...	Petroleum derivatives; essences; palm oil; copra oil; cod liver oil	623
Brussels ...	Chemicals; aniline dyes ...	621
Venezuela ...	Drugs; chemical products ...	640
Montreal ...	Glass; zinc in all forms	—

Reorganisation of German Chemical Societies

The "Emil Fischer Society" was founded on June 15 for the encouragement of chemical research. It is taking the place of the "Verein zur Förderung Chemischer Forschung," a society founded prior to the war, and which, in conjunction with the "Kaiser Wilhelm-Gesellschaft zur Förderung der Wissenschaften," organised the formation of the "Kaiser Wilhelm Institut für Chemie," which has been unable to continue owing to lack of funds.

On June 16 another new organisation, the "Adolph Baeyer Society" was founded with the object of securing the continuance of the publications of the German Chemical Society, which include: (1) The "Berichte"; (2) Chemisches Zentralblatt; (3) General Index to Berichte and Zentralblatt; (4) "Beilstein"; (5) Supplementary volumes to "Beilstein"; (6) the "Lexicon of Inorganic Compounds"; and (7) the "Literatur-Register" of Organic Chemistry. The cost of preparing these publications, which are held to constitute the very foundation of chemical science and industry, is now exceedingly heavy, and the raising of adequate capital to ensure their future is considered imperative. Although valuable contributions have been intimated, and many existing societies have joined the Adolph Baeyer Society, a great deal still remains to be done.

The technical-scientific section of the Union of German Ceramic Trades (Verband keramischer Gewerbe in Deutschland), which was founded in 1913, has now been changed into the German Ceramic Society (Deutsche Keramische Gesellschaft). A special feature of the policy of the new society will be to foster close co-operation between scientific and State institutions and all branches of the ceramic industry. The Government Porcelain Factory in Berlin and the corresponding Experimental Station at Charlottenburg have definitely promised support, and other institutions will undoubtedly follow their lead.

It has recently been decided to establish a research institute for the German cement industry.—(*Z. angew. Chem., Aug. 27, 1920.*)

Langdale's Chemical Manure.—For the year ended September 30, 1920, profit is £11,910, the balance to be added from last year, £248, brings the figure up to £12,158. A final dividend of 5 per cent., free of tax, is proposed, also that £3,000 be appropriated to meet liabilities such as E.P.D. This will leave £983 to be carried forward. The directors report that the company's Irish trade has been abandoned, and foreign trade is nil owing to inability to compete with foreign markets.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

London Gazette

Partnership Dissolved

CROSS, ERNEST, and AINSWORTH, HERBERT, colour and chemical merchants, 85, Bridge Street, Manchester, under the style of Ernest Cross & Co., by mutual consent, as and from August 12, 1920.

Bankruptcy Information

BONAVENTURA, FELICE ADOLFO, AVELINE, HUGH EDWARD, and HARRISON, EDWARD, chemical merchants and importers, in co-partnership as Felice Bonaventura & Co., at 24, Great Tower Street, London, E.C. October 27. First meeting, November 12, at 11 a.m., Bankruptcy Buildings, Carey Street, London, W.C.2.

Notice of Intended Dividend

BALL, PERCY FIELDING (carrying on business under the style of John Ralph & Co.), Green Bank, Trimmingham, Halifax, and carrying on business at Mearclough Mills, Sowerby Bridge, Yorkshire, and at 41, Corporation Street, Manchester, drysalter and oil merchant. November 17. Trustee, W. Durrance, Official Receiver's Office, 12, Duke Street, Bradford.

Company Winding Up Voluntarily

THE MAGNESIUM CHLORIDE CO., LTD. (in voluntary liquidation).—A meeting of creditors will be held at 34a, Buckingham Palace Road, London, S.W., on Wednesday, November 10, at 2.30 p.m. Creditors' claims on or before December 3, to the liquidator, L. M. Wilson, at the above address.

Liquidator's Notice

BASIC PHOSPHATE CO., LTD.—A general meeting of members will be held at the Carlton Iron Works, Carlton, via Ferryhill, on Friday, December 3, at 11 a.m. W. Thomlinson, liquidator.

Mortgages and Charges

*[NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, created after July 1, 1908, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges which would, if created after July 1, 1908, require registration. The following Mortgages and Charges have been so registered. In each case the total debt, as specified, in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced since such date.]*

CALVERT DYES, LTD., Mirfield.—Registered October 25, £5,000 debentures; general charge. *£5,000. January 26, 1920.

RICHMOND GLASS WORKS, LTD., Richmond (Surrey).—Registered October 20, £500 debentures, balance of £1,500; general charge.

UNITED OILS CO. (LONDON & CARDIFF), LTD., London, E.C.—Registered October 26, £10,000 debentures (filed under Sec. 93 (3) of the Companies (Consolidation) Act, 1908), present issue £5,000; general charge. *Nil. May 19, 1920.

County Court Judgments

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

EDWARDS, J. MACHONICHI, 311, Fulham Palace Road, London. Chemist. £24 1s. 7d. September 22.

MORGAN, H., 10, Armoury Street, Ebbw Vale. Chemist. £14 3s. 8d. August 17.

NICHOLLS, F., 14, Warton Terrace, Newcastle-on-Tyne. Druggist. £12 19s. 6d. September 23.

New Companies Registered

The following have been prepared for us by Jordan & Sons, Ltd., company registration agents, 116 and 117, Chancery Lane, London, W.C. :—

The following have been prepared for us by Jordan & Sons, Ltd., company registration agents, 116 and 117, Chancery Lane, London, W.C. :—

ALLIANCE COLOUR & CHEMICAL CO., LIMITED., Radnor Street, Stretford, Manchester. Chemical manufacturers. Nominal capital: £30,000 in 4,000 preference shares and 26,000 ordinary shares of £1 each. Directors: H. Matley, F. Brotherton, H. Brotherton. Qualification of directors: 200 ordinary shares.

CABEB DUCKWORTH, LTD., The Cloth Hall, Walton Street, Colne. Drysalters and druggists. Nominal capital: £20,000 in 20,000 shares of £1 each. Directors: C. Duckworth, A. Duckworth, K. Duckworth. Qualification of directors: £1,000.

EPOK, LTD., Chemists and druggists. Nominal capital: £5,000 in 5,000 shares of £1 each. Directors: to be appointed by subscribers. Qualification of directors: £250. Subscribers: E. H. Beset, J. P. Anderson.

CROW, CATCHPOLE & CO., LTD. Distillation of tar. Nominal capital: £500,000 in 250,000 "A" preference shares, 150,000 "B" preference shares, and 100,000 ordinary shares of £1 each. Directors: C. W. Small, H. W. Crow, A. A. Catchpole, F. E. Catchpole. Remuneration of directors, £200 each; chairman, £250. Subscribers: H. W. Fordham, H. W. Hodd.

MAYS' CHEMICAL MANURE CO., LTD., Eastgate, Bourne, Lincolnshire. Chemical manure manufacturers. Nominal capital: £30,000 in 30,000 shares of £1 each. Minimum subscriptions: £7. Directors: T. W. Mays, G. H. Mays, T. W. Atkinson, A. Gee, F. Sugden, B. Webb, A. E. K. Wherry. Qualification of directors: £500. Remuneration of directors: £100 each.

PUREL REMEDIES, LTD., 14, Broadfield Road, Heeley, Sheffield, Pharmaceutical chemists. Nominal capital: £2,000 in 2,000 shares of £1 each. Directors: B. Ellis, J. S. Longbottom. Qualification of directors: £150.

TURNERS (PRESTON), LTD., Back No. 6, Tulketh Brow, Ashton-on-Ribble, Preston. Chemical manufacturers and soap boilers. Nominal capital: £1,500 in 1,500 shares of £1 each. Directors: J. B. Turner, F. Kay, A. M. Parkinson. Qualification of directors: £50.